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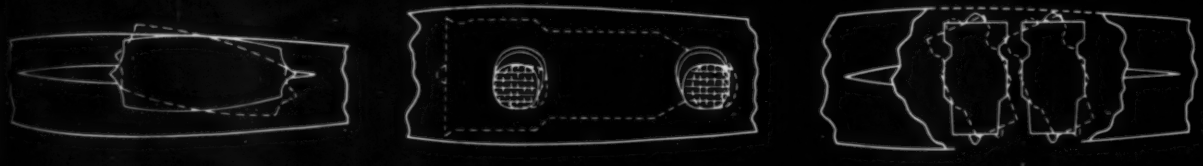

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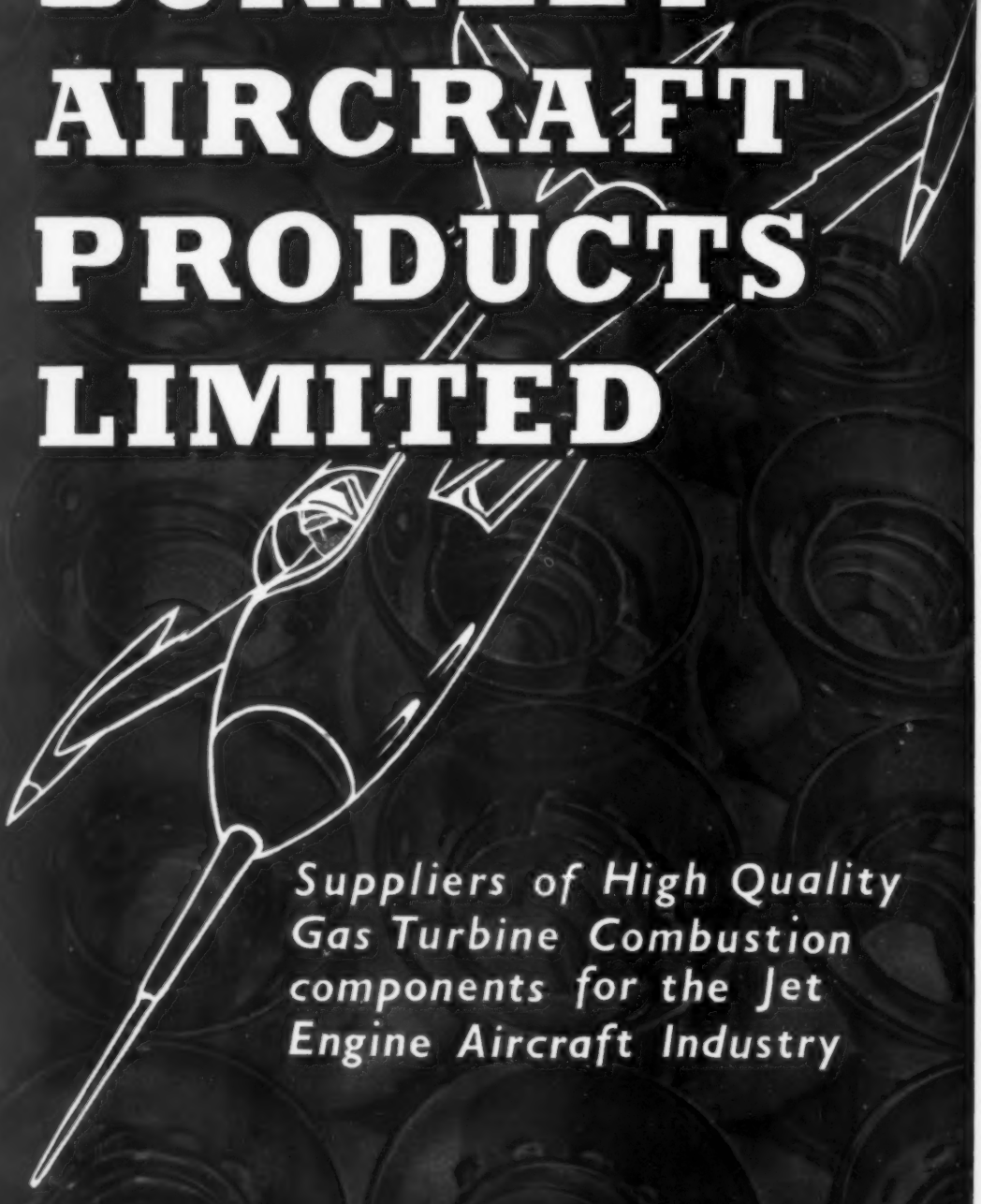

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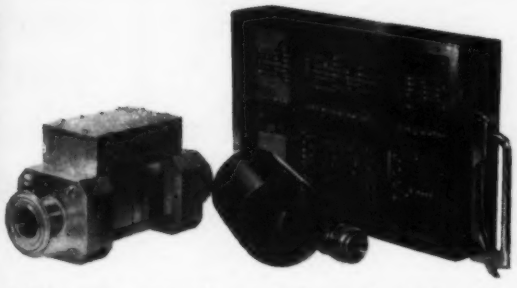

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No 2751 VOLUME 80 THURSDAY 30 NOVEMBER 1961

FLIGHT

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IN THIS ISSUE

From All Quarters 838
Abroad with a Vulcan 840
Safety, Economy, Comfort 842
HMPA Puffin 843
Missiles and Spaceflight 844
Sport and Business 848
After the DC-8 849
B-17s Fly Again 850
Cunard Eagle Western 852
Straight and Level 854
Flight System Survey 855
Correspondence 856
The Industry 858
Air Commerce 859
Service Aviation 866

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Transportation . . .

A CLEAR decade before the business of air commerce began to affect the health, wealth and happiness of mankind *Flight* described itself as "a journal devoted to the interests, practice and progress of aerial locomotion and transport." We are especially proud of that word "transport," because at the time—January 1909—its use in an aeronautical context was novel.

For well over 50 years, then, the triumphs and disasters of air transport, the lustrous aspects as well as the dull (and occasionally the tarnished) have been our business, our inspiration and our challenge. Week by week the affairs of this vast industry have become, and must continue to become, increasingly our own; and this week above all is one of special significance.

After months of chronicling the proceedings before the Air Transport Licensing Board, in the course of which this journal was named on several occasions, we now record a Ministerial decision described on page 859 as "stunning." It provoked the spectacle of a concerted walk-out from the ATLB courtroom by British United Airways.

In the House of Lords *Flight's* commentaries on airline affairs have in recent days been cited at length, and in the House of Commons—in recent days again—our inquiries into air safety have received acknowledgement. These same inquiries are being pursued with increasing diligence by our special correspondent Frank Beswick in a new series of interviews with leading authorities, the first of which appears on page 842.

In very large degree air-safety standards must be appraised in the context of air traffic control, and this week also the debate on Eurocontrol has brought the realization (in the words of the Parliamentary Secretary to the Minister of Aviation), that this is the first occasion on which Great Britain has joined a purely European institution as a founder member. It is one, nevertheless, which represents, if not a loss, then a decided shifting, of sovereignty.

. . . is Civilization

In the months ahead, conjointly with our inquiries into safety, we shall be probing and sounding in the turgid waters of airline finance. Few people would disagree with the Minister of Aviation that BOAC's loss of something like £10m "simply cannot be ignored." More especially we shall be investigating the possibilities of cheaper air fares. The comfort and convenience of passengers will come under scrutiny as factors to which, in our estimation, far from adequate attention has been paid in the fervid early years of big-jet operations.

We opened these reflections with the dedication of *Flight*, at its very birth, to the interests of air transport; and we are now reminded that in that natal year, 1909, Rudyard Kipling published his wonderful story of the years to come. Called *With the Night Mail*, it was the first appearance of air transport operations in literature, and it was illustrated with "advertisements"—supposedly from an aeronautical journal the apparent identity of which affords us, over the years, increasing pride and pleasure. The story was much concerned with a body styled the "Aerial Board of Control," whose motto was "Transportation is Civilization." Kipling's story, of course, was sheer romance; yet, notwithstanding the grave and pressing issues to which we have alluded above we continue to view the future of the air transport industry as the Parliamentary Secretary views the aircraft manufacturing industry—"It has a tremendous future still." That future must be our own.

FAIR SHARES FOR ALL is the goal behind the far-reaching agreements discussed on this page. Pictured at the signing of the earlier, six-nation agreement at Kingston on November 17 (left to right): Mr E. G. Rubython, Hawker Aircraft general manager; Sir Roy Dobson, Hawker Siddeley Group managing director; Mr Tony de Graff, representing Breguet; Mr Frits Diepen, Fokker; and Mr J. T. Lidbury, HSA chief executive

FROM ALL QUARTERS

End of the Suspense

AFTER almost four months' suspense, Britain's airline industry was told last Friday the terms of the Air Transport Licensing Board's decisions in the major European case heard last summer. Broadly speaking, the Board gave away about one-half of what had been requested. The biggest applicant, British United, came off best with 12 approvals as against ten rejections. As most of the approvals were granted in the terms asked for, and as these included the two plum routes in terms of capacity—Paris and Genoa—this means that BUA have scored rather more than evens.

The second main applicant, Cunard Eagle, did less well with a score of nine approvals versus ten rejections. Because the frequency of the CEA approvals was on average only half that granted, it appears that CEA get perhaps a third of the requested capacity.

BEA scored two successes in being awarded Marseilles and Malaga (these were unopposed) but lost out on Madeira and Genoa, both these important new routes having gone to BUA. All applications by Silver City were rejected, apparently because of their unreadiness to invest in modern aircraft. Also rejected were the applications by East Anglian Flying Services. Of Tradair's nine applications for scheduled inclusive-tour services, four would have been successful but for the company's financial resources.

The full list of approvals is as follows: *British United*, London to: Amsterdam, Athens, Barcelona, Basle, Genoa, Madeira, Malaga, Milan, Palma, Paris, Tarbes and Zürich; *Cunard Eagle*, London to: Belfast, Copenhagen/Stockholm, Dublin, Edinburgh, Geneva, Glasgow, Venice, Dublin, and Manchester - Birmingham - Nice; *BEA*, London to: Malaga and Marseilles; *Starways*, Chester/Isle of Man. All licences are for restricted frequencies and cover seven years starting on April 1, 1963.

We hope to analyse these decisions in more detail next week.

Realignment in Europe

INCREASINGLY since 1958 the idea of international collaboration in aircraft design and manufacture has appeared to be a good one, and announcements by the two principal UK aircraft-manufacturing groups on November 20 and 22 indicate that months of sometimes frustrating discussion have been brought to a successful conclusion. The aircraft industry of Europe is on the way to becoming partly unified, in order to meet NATO requirements but principally because this makes sound commercial and technical sense.

Details of the November 20 announcement by Hawker Siddeley Aviation were given last week. The second consortium was announced by BAC on November 22, in the following terms:—

"British Aircraft Corporation announces that it has reached agreement with four European aircraft firms for collaboration in joint projects. These firms are Sud Aviation (manufacturers of the Caravelle jet airliner) and Marcel Dassault (manufacturers of the Mirage supersonic fighter) both of France; Finmeccanica of Italy (a large industrial combine including the aircraft company Aerfer of Naples) and Dornier-Werke of Germany.

Marcel Dassault The collaboration between British Aircraft Corporation and General Aéronautique Marcel Dassault concerns the Dassault Mirage 3V. This aircraft is a VTO version of the highly successful family of Mirage fighter, ground-attack and reconnaissance aircraft. The basic Mirage 3C is well proven M2+ aircraft and has already been ordered by the air forces of France, Australia and Switzerland. The Mirage 3V will use Rolls-Royce lift engines to provide VTOL. In this form it becomes a highly suitable solution to the NATO requirement for a fighter and reconnaissance aircraft.

British Aircraft Corporation and Dassault believe that their joint proposal for the Mirage 3V is a practical step towards two important needs, the standardization of NATO equipment and co-operation between major European aircraft companies. Dassault already have a collaboration agreement with Sud Aviation.

The preliminary agreement envisages a joint sales programme and a licensing arrangement. Design and development work under this agreement will be carried out by the aircraft division of English Electric Aviation at Warton, Lancashire, under the direction of Mr F. W. Page, the chief executive there.

Sud Aviation Sud Aviation and British Aircraft Corporation are currently making collaborative arrangements which cover both existing and long-term aircraft projects. Sud Aviation is assisting in the production of the VC10 long-range jet transport by constructing some important subassemblies. Among the long-term projects being examined is possible collaboration in the field of a supersonic transport.

Finmeccanica and Dornier British Aircraft Corporation, Finmeccanica and Dornier are associated in a joint submission which they are making for a tactical STOL military transport aircraft to a NATO specification. The Bristol design team, led by Dr A. E. Russell, of British Aircraft Corporation has been co-operating with the Italian and German members of the consortium on this aircraft. Should the contract be awarded to this consortium, the work will be shared."

These far-reaching links have come about partly by the pressure of ministers and partly by a natural wish to avoid duplication and to make the most efficient use of Europe's limited facilities for producing future aircraft. It will be realized that the BAC agreements cover both NATO and civil projects. In the case of the latter, the deal with Sud stems from initial discussions some 18 months ago, and from the fact that the MoA study contract for a supersonic airliner placed in the summer of 1960 stipulated that BAC should explore the possibility of overseas co-operation. The NATO arrangement seems to be a simple case of BAC agreeing to act as UK foster-parents for the design which they feel has the best chance of meeting both the NBMR-3 specification and the anticipated Air Ministry Requirement for such a machine. The Mirage 3V is a firm Dassault/Rolls-Royce project sponsored by the French Government; BAC will see to it that it is properly presented to the RAF and RN, and suitably Anglicized where necessary.

Unlike the Hawker Siddeley consortium, the BAC group also embraces the NBMR-4 NATO tactical transport project. Bristol Aircraft, a BAC member, are known to have done much work on the Model 208, a four-Pegasus S/VTOL transport to meet a known RAF need. Such a machine would be too large for NBMR-4, and one must conclude that BAC already are at work on a smaller version. Finmeccanica will assist them in design work.

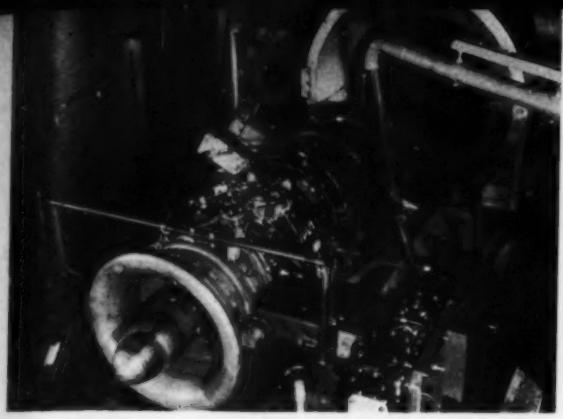
As for civil aircraft, it now seems clear that BAC and Sud are on the way to sharing the available business in a manner which should be an object-lesson to companies or countries suffering from an excess of prestige. Sud have now received the assurance of their government's backing for the Super Caravelle, as noted in the next news-item; and it is not too difficult to deduce that they will probably not proceed with the Baby Caravelle (as we forecast on November 16). In return they will share in the manufacture of BAC airliners, and may well make the VC10 tailplane.

The following is a preliminary list of projects and companies at present likely to make submissions in the NATO Basic Military Requirement -3 (strike) and -4 (transport) competitions:

NBMR-3 Group 1: Hawker + Focke-Wulf (P.1127 development); Fokker + Republic (D-24 Alliance); Fairey/SABCA; and Breguet. Group 2: Dassault + British Aircraft Corporation (Mirage 3V). Group 3: Lockheed Aircraft + Short & Harland (F-104 development). In addition, Nord-Aviation, SNECMA, Entwicklungsring Süd, MAN, and Fiat are all known to have been working in this field.

NBMR-4 Group 1: British Aircraft Corporation + Dornier + Finmeccanica (scaled-down BAC-208). Group 2: Canadair + de Havilland Aircraft of Canada. Group 3: Ling-Temco-Vought + Ryan + Hiller + European firms (said to include Sud and/or Fiat). Group 4: Hawker Siddeley Aviation + Continental firms, probably including Focke-Wulf (several designs).

RIG-TESTING the thrust reverser of the Bristol Siddeley BS.75 on a slave Olympus, preparatory to the first run in January. A second BS.75 will be completed in February, and engines for flight installation will be available early in 1963. The 7,550lb-thrust turbofan is under consideration for a variety of military and civil aircraft



STATIC SERPENT: Bench running of the Bristol Siddeley Viper 20 turbojet is now in hand at Patchway; an order worth £1m has been placed for Viper 20s for the D.H.125, and this 3,000lb engine is also said by Bristol Siddeley to have been chosen to power the Piaggio Douglas 808

Britain and the Supersonic Airliner

NEITHER France, the United States nor the United Kingdom, either singly or collectively, has taken a decision to proceed with the production of a supersonic transport. This was said by Mr Peter Thorneycroft, Minister of Aviation, in the House of Commons on November 20. He was being asked about Press reports on possible Anglo-French co-operation (*Flight*, last week, page 794).

Only three days later, on November 23, *The Times* reported that the French Cabinet had approved the construction of a French supersonic medium-range airliner. The same day, during the civil aviation debate, Mr Thorneycroft told the Commons that, according to his information, the French decision "does not indicate a firm decision to build a supersonic type of aircraft, but that financial provision has been made in principle for the work that may be taken on for such a project in the next year or two." He had, he said, been assured that this was entirely without prejudice to the outcome of Anglo-French discussions about sharing the cost.

Retirement of Mr Lindsay Hunting

AS we go to press we learn that Mr Lindsay Hunting is to retire at the end of the year from the chairmanship of the Hunting Group. Mr Hunting, who is 70 years of age, will continue as a director. He will be succeeded as chairman by Mr C. P. M. (Pat) Hunting, the present vice-chairman and son of Sir Percy Hunting, himself a former chairman of the group. The new vice-chairman will be Mr L. C. (Clive) Hunting, son of Mr Lindsay Hunting.

Parliament Debates Civil Aviation

IN last week's 6hr debate on civil aviation the Opposition in the House of Commons set out to challenge the Minister on three matters; safety, the working of the Licensing Act, and, as Mr Strachey phrased it, "the consequential effects of any weakening of the position of the corporations on the British aircraft industry."

The safety issue was clouded by overheated charges and counter-charges about the respective merits of the corporations and independent companies. Mr Mason made the extraordinary suggestion, among others, that pilots flying for the independent companies were not always "fully familiar with the aircraft and equipment which they have to use."

The air accident figures published by *Flight* were widely quoted, but the Parliamentary Secretary asserted at some length that "statistics which are used in different ways as the basis of criticism are open to a good deal of argument."

Mr Strachey, opening for the Opposition, did not think the statistics could be construed as a criticism of the independent operators as such but that the regulations on charter flying ought to be tightened. In particular, he wanted paragraph 1 (5)(a) of the Tenth Schedule of the Air Navigation Order 1960 to be amended and the onus for ensuring that the pilot had adequate knowledge of all the route characteristics to be placed upon the Minister.

On the 1960 Licensing Act, Mr Strachey wanted the Minister to give new terms of reference to the ATLB. He thought that, following the Minister's decision on the Cunard Eagle Atlantic application, "unless simple and comprehensive terms of reference are given to the Board, if necessary by means of legislation, the Board will founder, as it has undoubtedly and incontrovertibly foundered up to now. . . . There is no sense in the terms of reference of the Board today."

Mr Thorneycroft's own explanation of his decision was that he took account of the whole position; the gross over-capacity on the route; the evidence that BOAC was intending cutting its capacity; the weakening market; the trading position of the present operators; the probable effects of international negotiation of traffic rights, and the likely price we might have to pay for them.

In another part of his speech the Minister made a brief reference, to new Government policy, which may well have had considerable bearing on the Atlantic decision: "An important policy decision with regard to nationalised industries was taken fairly recently by the Government. This refers to the corporations also. It is to set down and agree with them targets of profitability. . . . I am working out with the two corporations targets we can all agree upon as reasonable. . . ." It is difficult to see how any "reasonable" target for the foreseeable future can be discussed with BOAC (who are facing a loss of £10m for the current year) if the corporation is also being told to accept another British competitor on the Atlantic route. It is difficult to see how the House can avoid a more detailed discussion of BOAC's alarming financial situation.

This £10m announcement startled the House but provoked little more than gestures of astonishment. In the House of Lords the previous day their lordships got a little closer to the corporations' problems on a motion by the Earl of Gosford. Lord Merrivale used some words by the Air Transport Editor of *Flight* about the invigorating selling activities of Cunard in the American market to support a suggestion that we should get a larger British share of the Atlantic traffic if Cunard Eagle had been given the opportunity for which they asked. The Earl of Longford wanted more information about BOAC policy on its associated companies and commended Frank Beswick's recent *Flight* interview with Mr Keith Granville.

Both Houses showed concern about the outlook for the aircraft constructors. The Opposition case that expanding corporations were essential to a stable aircraft industry was controverted by Mr Maxwell-Hyslop, who claimed that the BAC One-Eleven, not ordered by the corporations, was probably our best single chance of breathing new life into the aircraft industry. He developed the further interesting point that it was probably an advantage to the BAC One-Eleven *not* to have received an order from either BOAC or BEA, since they had given the kiss of death to more than one aircraft type. He thought this certainly was so in the case of the Trident and probably so in the case of the Vanguard, which had been stretched to suit the route patterns of two customers only.

IN BRIEF

Founder and managing director of Vigors Aviation Ltd, UK distributors for Piper aircraft, Wg Cdr T. A. Vigors has resigned from the company, although he is remaining on the board in an advisory capacity. The new managing director is the Marquess of Kildare, who has been a board member for the past five years.

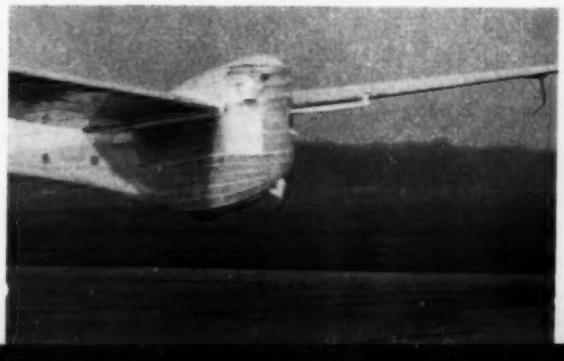
Lord Douglas of Kirtleside, chairman of BEA, has been appointed president of the Seaplane Club, formed earlier this year to revive interest in floatplane aviation (*Flight*, July 27, page 106). Dr Reginald Bennett, MP, who flew Walrus amphibians during the war, is vice-president. The flying base will be at Lee-on-Solent, Hants.

Racing driver Gavin Youl, of Tasmania, is on a 12,500-mile flight from Luton to Tasmania with two passengers in a Cessna 180, which he is delivering for Jack Brabham to a purchaser. The flight started on November 18, but a radio failure over France compelled a new start on November 21.

Hawker Siddeley Aviation's programme of matching facilities to the order-book should be completed by the announcement that the DH Aircraft Christchurch plant, currently employing some 1,800, is to run down and close by next July. Already announced are the forthcoming reduction of employment at Whitworth Gloster's Gloucester factories by some 4,000; the closure of the assembly portion of DH Aircraft at Portsmouth, reducing employment there by some 1,200; and the impending redundancy of about 350 at Chester and 400 at Hatfield.

"FLIGHT" ON TELEX

In common with other Dorset House journals, *Flight* is now on the Telex system. The number is Telex 25137, and our telegraphic address is "Flightpres London Telex." Other Telex subscribers using the service should preface their messages with "*Flight* Editorial" or "*Flight* Advertisements" as the case may be.



THE PUFFIN—by the Hatfield Man-powered Aircraft Club—gets airborne. As explained in the preliminary description on page 843, the propeller is at the tail, and over a dozen full flights have already been made. Southampton University's rival effort was described last week

"Flight" photograph

Boarding Vulcan XA912 at Luqa. Note the aerial between the starboard jetpipes

Abroad with a Vulcan

BY MARK LAMBERT

DURING the week before last, Malta held its annual air-defence exercise and the detachment of four V-bombers normally stationed there was increased by one complete squadron of Valiants, No 7 from Wittering. The detachment was four Vulcans of No 101 Sqn from Waddington. Also involved were Canberra B(I).8s and PR.3s, Javelins with Firestreak, Shackletons of No 38 Sqn, French Neptunes and carrier-borne aircraft of the Fleet Air Arm and the US 6th Fleet. The main RAF airfield at Luqa, which is pretty versatile in the normal run of things, managed during the exercise to launch bombers, dispatch fighters and target aircraft, process Transport Command aircraft and keep up the normal flow of civil traffic.

To round off the very busy week, the V-bombers made a final pair of flights intended to exercise the ability of Luqa in Malta and Akrotiri in Cyprus to turn round and rearm their aircraft as quickly as possible. The V-force has both nuclear and conventional rôles and it is obviously necessary to ensure that, in the conventional rôle, they can rush off to a distant point and operate effectively at short notice. Heavy servicing equipment is pre-positioned for this purpose, but groundcrews and lighter equipment are ferried out by Transport Command as the bombers are deployed. During the recent troubles at Kuwait, the V-bomber detachment at Malta was doubled. After the Maltese exercise, the V-bombers returned to their bases in England and were reconverted to their nuclear rôle after a few hours of work. They then rejoined the deterrent routine of alert status and training flights.

The conventional logistics exercise in Malta and Akrotiri provided an excellent opportunity for observing the V-force at work in slightly less security-ridden circumstances and I was therefore flown out to Malta by Transport Command Comet 2 from Lyneham, a rewarding experience in itself. We followed the upper air route over London, Montélimar and Nice, Elba, Naples and Palermo, watching the full sweep of the French, Swiss and Italian Alps slip by beneath us as we cruised at 35,000ft and M0.73 past Lyons. The Comet 2 now has the Smiths SEP.2D autopilot with height and speed locks and approach coupler; and VOR will soon be added to VHF, UHF, Gee, ADF and ILS. The level cruise technique is used in deference to airways procedure.

Coastal Command Shackletons are normally based at Luqa, providing rescue service as well as ASW. Surprisingly, they are called out to look for vehicles strayed in the African desert as well as to look for lost yachts or damaged ships. They average two emergency calls per week, many of them annoyingly false alarms. Standard SAR load is a Lindholme cluster, desert survival canisters, flares and smoke floats. We were shown a war-load which included both active and passive sono-buoys, markers, depth charges, and several homing torpedoes. The latter are dropped on parachutes, which are released as the torpedo enters the water. At the same time the offset nose cap is wiped off to expose the acoustic transducers; and the battery-driven motor begins to drive the contra-rotating propellers. Search accuracy of the airborne equipment is several times the range of the torpedo; and the torpedo itself is neutralized if it rises to surface-ship depth. Friendly ships taking part in the search are therefore safe from the torpedo.

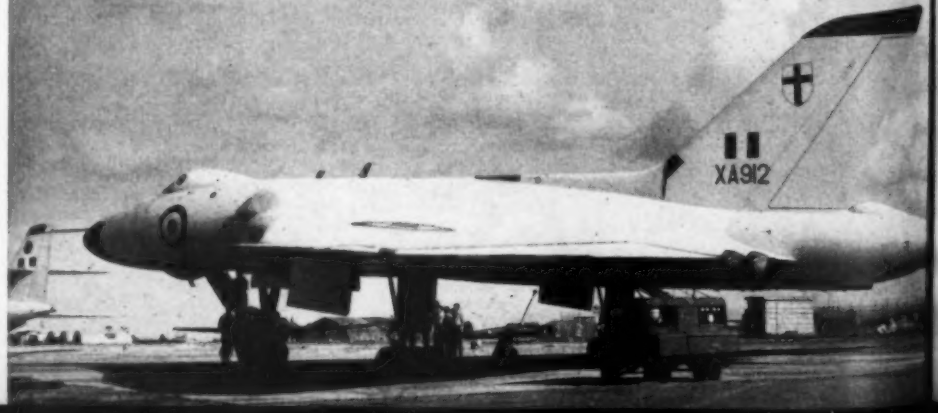
Just how much the V-force is progressing and improving became evident from my two days with a Vulcan crew and with the operations team sent out from Waddington. The alert status now seems to be an accomplished fact and the four V-bombers stationed at any particular base can be scrambled by direct order from Bomber Command headquarters in under two minutes. All crews must also be capable of operating anywhere in the world and the "Lone Ranger" flights have already been going on for some years. "Western Rangers" are flown regularly to Canada and the USA, providing crews with experience of extreme cold operations during the Canadian winter. "Polar Bears" take V-bombers to various bases in Norway; and there are the occasional flag-showing tours in South America and other areas. Each crew makes two or three such journeys each year. Flight refuelling capability is spreading steadily through the force, being intended as a means of rapid reinforcement rather than a technique to be used during an actual attack. There is a great deal of organization to be done if a group of aircraft are to be able to call for tankers at fairly short notice, when the tankers may be stationed a long distance away.

Equipment in the aircraft is being increased all the time and serviceability has also improved steadily over the years. The number of control panels in the navigation compartment has greatly increased since I last flew in a Vulcan two years ago, and the Mk 1A aircraft I flew in from Malta had the swollen tail, containing electronic equipment, which first appeared on the B.2 prototypes. The large, flat aerial between the starboard jetpipes is also fitted. The Olympus engines themselves have been considerably up-rated. Relatively few spares have to be carried on trips abroad and few aircraft go unserviceable. The crew chief is the central figure in the life of the aircraft and stays with it wherever it goes.

In order to exercise the logistics organization in this last phase of the Malta exercise, the Valiants of No 7 Sqn and the four Vulcans of No 101 Sqn were dispatched from Malta on a profile mission which took them over several targets and across the Med to Akrotiri. There they were refuelled rapidly at night, the crews were rebriefed and fed and the stream took off for an astro-navigation flight back to Malta. Immediately, the aircraft were refuelled and loaded with 1,000lb bombs—21 in the case of the Vulcan.

I flew with Flt Lt J. J. Guntrip in Vulcan 1A XA912. Flg Off Prideaux was co-pilot, Flt Lt Potter navigator plotter, Flt Lt Tobin navigator radar operator, and Flt Lt Dunstan air electronics officer. I had already been medically examined and decompressed in England and had brought flying clothing with me. Parachutes, dinghy packs, meal boxes and bags of equipment were loaded on board and we started up and began check-lists in the bright sun-

"Flight" photograph



Our Vulcan 1A, with its electronics-laden tail, in dispersal at Luqa

Above, Flt Lt Guntrip (left), aircraft commander, and the writer confer with a crew chief at Akrotiri

Right, preparing to bomb-up a Valiant with the hoist through the top of the fuselage

light of early afternoon at Luqa. The hours of pre-flight study and special briefing had been completed long before.

On the exact allotted minute we opened up to full power, lifted off the runway and set course north-westerly for the Tyrrhenian Sea north of Sicily. Down in the bowels of the aircraft I had my jump seat and parachute. All round were fuze cases, stacks of meal boxes, a spare braking parachute about the size of an arm-chair and weighing 200lb, the ladder up to the pilots' ejection seats, the three rearward-facing crew seats and the main door with its folded ladder. When we had climbed to above 40,000ft, the pilots had the sun-blinds down against the intense glare, but the instrument panel was illuminated with white floodlights. It gets dark in the shade at that height. The navigators sat in artificial light quietly working, the insistent tick-tick of the Doppler distance-gone counter distinctly audible above the rush of air outside. The radar sweep was wiping restlessly about the screen as Flt Lt Tobin probed the earth below for more than 100 miles all round. We wore our oxygen masks loose, because cabin altitude was very low, but metal fittings in contact with the outside skin bore a thick coat of frost. Underneath the "bridge" on which the crew sat was the entrance—and bale-out—door, and further back some lights showed up nest after nest of black boxes with their coloured cable harnesses. Ahead of the spare brake parachute was the big lid over the visual aiming window and its bomb sight. Ahead again the padded bulkhead beyond which was the main radar scanner.

The lid was opened as we ran in for our first target, a mole in Genoa harbour. I lay across the parachute pack and watched the target slip by eight miles below as the crew went through the bombing routine. The aircraft was flown on autopilot all the time, and control was passed over to the radar operator for the final run. He then handled the aircraft with the miniature joy-stick on his desk, having first locked the bombing system onto the target. The visual sight beneath me followed through all by itself.

Once past Genoa we swung east and then south and repeated the procedure on a target in Naples harbour. The Apennines slipped by, then the target, then all Capri slid across my window and we were back over the Tyrrhenian. I could remember so well having crossed that sea direct from Naples to Palermo in a light aircraft. Then it took two hours: now it was gone in twenty minutes and we turned south-east. The tension of the attacks was gone and orange juice and meal boxes were passed round. The light faded on the ground, purple shade crept up to our level and soon we were in moonlight. Still the distance counter clicked away, and the radar searched like a silent windscreen wiper ahead. We made check-points to the second, the task of precision navigation never relaxed.

The gyro sextant was slipped up through the starboard opening and I scanned the white wing and intake by moonlight. Far below, cumulus and then cunim cloud built up. The sextant mount became stiff with ice unless I kept exercising it. After a while we found a favourable jet stream which whisked us along at a groundspeed of 690 m.p.h. From between the pilots' ejection seats I could see the cloud building up fast. As we began the let-down, radar picked up Cyprus and painted it like a relief map on the scope. It also painted thunder clouds and out through the windscreen I saw great, fat flashes of blue lightning in the moonlight, luckily beyond Akrotiri. At slow speed we let down into bumpier air, read off the check-lists, extended more airbrake and undercarriage and wallowed in under radar control. Standing normally on the ladder I could at first see the horizon. As we rounded out for the touchdown and the angle of attack increased I climbed until my head touched the ceiling, but still lost sight of the runway.

Slowly we taxied in, the door already open to admit fresh air. Cyprus was pitch dark, warm and very wet after heavy rain. Away to a meal, briefing, a quick reunion with friends. Cyprus was just the tarmac under my feet and the memory of that radar relief map. The turn-round went well ahead of schedule, the bowsers groaned away into the night, we climbed in, shut the door and re-entered our world of check-lists. Through the sextant I watched Akrotiri slip away as if it had been the surface of the Moon seen from a spaceship. We climbed back to our upper night again, but this time I listened to the precise question and answer of successive sextant shots, all pre-computed. Just 960 n.m. through an astronomical text-book against an 85kt head-wind, which meant only a delay in getting to bed. The blank Med slipped obediently across the plotter's table in a series of pencil notes until Malta again painted on the radar screen, clear and bright, to re-establish a link with base—and with other traffic which kept us waiting for several minutes. We approached from the south-west, the radar painting the island ahead except for Luqa, which refused to emerge from behind a hill. From between the pilots I saw the hill go by 300ft below in the moonlight, as we steamed down to the runway.

Because the taxiways were narrow, the crew chief plugged-in to the external intercom and walked beside the nosewheel, talking the pilot into his dispersal. From outside, this performance looked like a mahout leading his elephant from behind a front leg.

Immediately the aircraft was refuelled, apparently emptying several bowsers. Then a hydraulic power truck was brought up and three clusters of seven 1,000lb bombs, already mounted on beams, were wheeled underneath the cavernous weapons bay. Two 5ft-long portable hydraulic jacks were stood up under the ends of a beam and telescopically extended to pick-up sockets in the top of the bay. The jacks were simply contracted again and the bomb cluster was lifted neatly, with half-an-inch clearance each side, to its attachments. Electrical connections were made automatically by plugs on the beams and two wedges were wound home with long handles. Each cluster took only a few minutes to lift into position. The Valiant procedure is a little more difficult, as shown above.

Each sortie that night lasted about nine hours, including a little over two hours at Akrotiri—an unusually long stretch for air- and ground-crews. But it showed conclusively that a fairly large force of V-bombers can be operated effectively from bases not specifically equipped for them.

"Flight" photograph

Homeward-bound by RAF Comet: the Alps, looking towards Turin

Safety, Economy, Comfort

IN AIR TRANSPORT

FRANK BESWICK interviews SIR FREDERICK HANDLEY PAGE

FOR all the great technical advances made in aviation it is difficult to assert, without great qualification, that air transport is safer or more comfortable today as compared with a decade ago.

True, we can get over the weather, but we usually have to do so in company with a row of four or five other passengers, each squeezed into a seat several sizes too small. It is also true that the journey time is shorter, but what an austere journey it is! Gone are the days when one could move around and find a more congenial travelling companion. The spaciousness of the flying-boats is a thing of the past. It is conceivable that extra care and skill goes into the construction of aircraft, but how many more things there are to go wrong. Often it seems that in the excitement of designing a new generation of aircraft the essential requirements of air transport are forgotten. Speed is remembered. But are safety, economy and comfort?

That there is some public concern about air safety is clear. Is the concern justified? The Editor suggested I should put the question to authoritative people concerned in aviation from one angle or another. The viewpoint of the constructor is obviously important, so I asked Sir Frederick Handley Page. After all, his experience is longer than that of most. And as far as I know he is the only active individual at the top of the construction business who has been more or less continuously concerned with air transport. He has always been a utilitarian among the constructors. As can be seen, Sir Frederick was not always anxious to be pinned down, but his positive suggestions were as much to the point as ever. My first question to him was:—

There are a number of specific questions I would like to put, but first would you agree with the general proposition that there is some cause for concern at the way air transport is developing from the point of view of safety, comfort and economy?

I don't know [he replied] about your specific questions; you must let me develop this in my own way. But if we are to compare the safety position with some years ago, then one thing I would say is that it is a pity the way some people have rushed into air transport. Several organizations are now folding up, for financial reasons and so on. Fundamentally, the trouble is that to run an airline is a costly business, and you are dealing with a very perishable commodity. I remember Woods Humphrey once saying that the most perishable goods you could possibly sell are aircraft seats; once the aircraft have left the ground the empty seats are unsaleable.

But have we done enough to bring down the costs, apart from squashing passengers closer together?

Obviously, the more efficiently you use the available space—the more passengers per square foot, as it were—the more cheaply you can transport them.

But is there any other form of transport that has brought down its standard of comfort in the last ten years in the same way as has happened in the air? It has not happened with buses or with trains, has it?

I would say there's less room fore and aft for a bus passenger, and his seat is narrower.

Do you know of any bus in which the passengers sit three abreast on each side of a narrow aisle?

It is a question of *how long* you are expecting the passenger to sit. Alec Coryton once said he could sit on the point of a needle—provided it was for a sufficiently short period of time. I have travelled to Paris in the Caravelle, both first-class and tourist, and I would not complain.

But I cannot believe you are content to see so-called progress make further inroads in the amount of space allocated to each passenger? Surely there are other possibilities we should be studying?

Of course, it is a matter of balance. I agree we have gone far enough with passenger squashing, and we do need a new attitude towards air transport. By now there ought to be an air bus from London to Paris. Every hour on the hour—the sort of thing they already have in America.

With what kind of aircraft?

With the same kind as now.

But if we are really going to have this new attitude to air transport, surely we want a machine designed for the job? If you were sitting down with a team to consider the problem afresh, what kind of a machine would you envisage; would you put the same emphasis on speed?

Speed? I would say something about 275 m.p.h. If you have double the speed on the London to Paris service, how much time do you actually save? It's negligible. The real problem is to cut out the paper work at the airports, the waiting and the processing at each end. No booking, no queueing, none of this gimcrack ticketing. Buy your tickets on the bus—that is, in the aircraft in the air—carry your own luggage, and don't expect meals. You haven't time to enjoy a champagne lunch on the way over to Paris, anyhow. As for the aircraft, we want something simple; forget about Ferraris and Maseratis and come down to the equivalent of the Mini-Minor or the Green Line coach.

What about the long-haul aircraft? Many people look back to the flying-boats, the Stratocruiser, and even the little club bar in the tail-end of the Argonaut and say that air travel was pleasanter then than it is now. Is it not possible to let a man have a little more freedom to move about if he is on a long journey?

Certainly it was pleasant to go below and have a drink on a Stratocruiser, but you won't get cheaper travel that way. And if you cross the Atlantic in seven hours you can accept conditions differing from those when it took seventeen.

But is there not a case for sacrificing a little speed in favour of a little more space and comfort? Don't you think the pace has been set by the engines developed primarily for the military user? Might we not have had a safer and more comfortable civil aircraft if the whole machine, including the engines, had been thought of as a transport vehicle from the outset?

You could not develop an engine for civil transports only; it would be far too expensive. What we must look at is how we can make it possible for the power units to move a vehicle more efficiently. There is only one way, and that is to reduce drag. And the only aerodynamic solution for that is laminar flow. On a flat plate moving through the air you can reduce the drag to one-ninth if you eliminate the turbulence and have laminar flow. Think what you can do with all the power saved by cutting drag by eight-ninths. We have achieved a reduction in drag of 50 per cent by laminar flow on a Vampire wing right back to the trailing-edge, and the power required has been reduced tremendously.

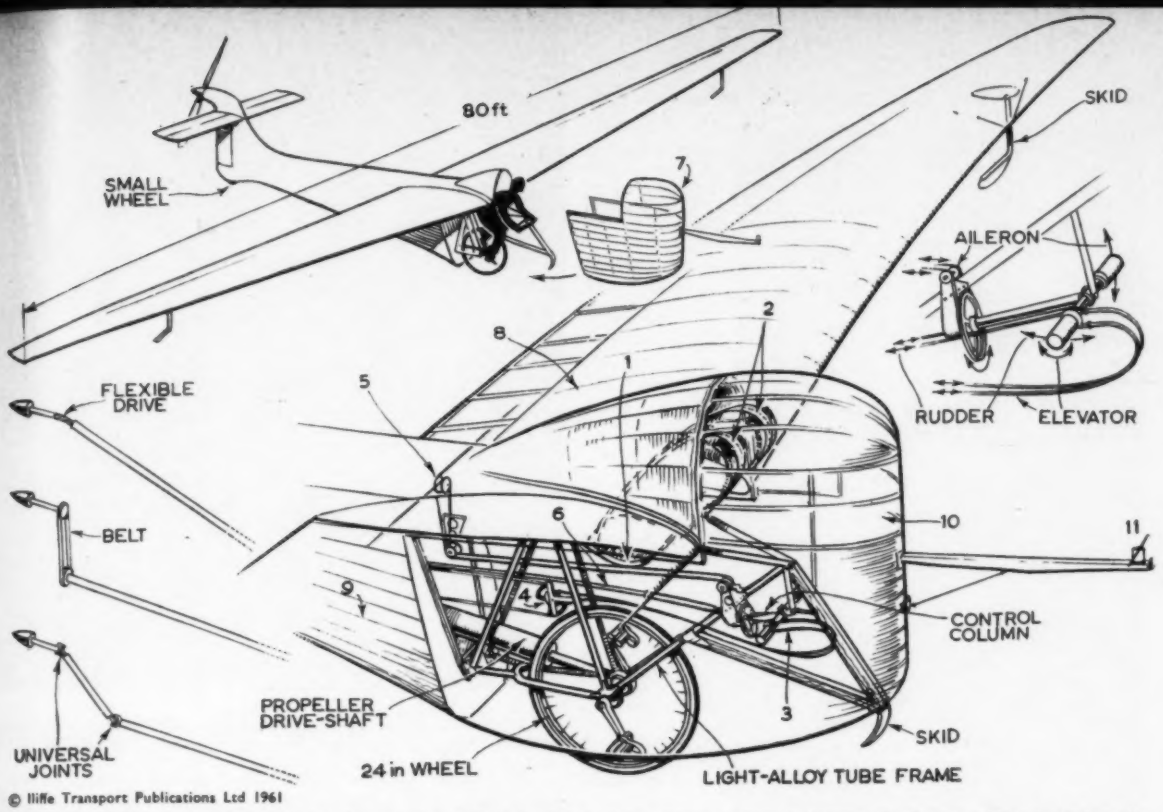
What we should be doing now is not squashing passengers but diminishing the resistance of the wings.

Have you any other thoughts on the long-distance aircraft we need?

Some stupid things are being said about the necessity for a supersonic aircraft. All this talk about striking in support of a supersonic machine is quite dangerous. If we were to concentrate all our resources on supersonics and neglect other research just because we could not afford it, we should be no better off.

If they want to provide employment, then the important thing is to reduce costs and enable more people to fly. It is the passenger who pays for the new aircraft. If the operator collected bits of money from more of them he could amortize his aircraft sooner and buy new ones.

[*Concluded on page 865*



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Interpretive sketches, with details showing the controls and three possible propeller drives: 1, seat; 2, harness; 3, elevator cables; 4, quadrant for (3); 5, aileron cables; 6, rudder cables; 7, detachable nose; 8, spruce spars, balsa ribs; 9, balsa planking; 10, transparency; 11, probable lifting arm and horizon reference. It must be emphasized that these illustrations are "Flight's" own interpretation of photographs

HMPA Puffin

PRELIMINARY DETAILS OF THE HATFIELD MAN-POWERED AIRCRAFT

ON November 21 the Hatfield Man-Powered Aircraft Club issued a statement which began: "Trials of the HMPA Puffin continue at Hatfield, and a number of successful man-powered flights under full control have been completed since the first flight on Thursday, November 16." The club is continuing to say as little as possible about the design of its aircraft, as we discussed in our report last week. But many features can be deduced from the photographs which have been released for publication.

John Wimpenny, the HMPAC chairman, first made a model of such a machine 15 years ago, and his early work was re-assessed in the light of new knowledge and formed the basis for the Puffin. The club was formed in August 1960, and membership has risen to 27. Officers are named in the caption below, but mention should be made of the great help provided by DH Technical School apprentices, and of J. N. Say and S. J. Oaten, the two instructors who supervised most of the actual construction.

Like the Southampton design, described last week, the Puffin has a conventional fixed wing and screw propeller; but the propeller is behind the tail and the gross weight is believed to be very little more than 100lb (the span, incidentally, is little less than that of the 200-ton project featured on page 849). Most of the structure appears to be spruce and balsa. The obviously laminar wing has considerable dihedral, and the static droop disappears in level flight. A nearly flat-bottom profile seems to have been chosen, and the covering appears to be Mylar or even balsa back to about 70 per cent chord and a transparent doped tissue aft.

Most of the body appears to have a balsa skin, although the removable nose is obviously skinned with something like a heavy grade of tissue (Cellophane or Mylar transparencies being inserted ahead of the pilot). The main "bicycle frame" appears to be of light-alloy tube, and the major loads are concentrated near the leading edge of the two root ribs. At the same points are attached the moulded seat-pan and padded shoulder harness, which reacts against forwards and upwards (pedal) loads. Ahead of the main frame is a wooden triangulation carrying the nose skid.

Pilot attitude is the classic one of a racing cyclist, with body bent well forwards and hands on a low-mounted handlebar. The latter is suspended on a subassembly off the main frame, pivoted to a fore-and-aft rotating tube, the rear bearing of which also carries the aileron pulleys. The rudder cables run aft inside a sheath, presumably to prevent chafing against the pilot's legs; aileron control is pure aircraft practice, as the drawings show (although we know nothing of the surfaces themselves); and the elevators appear to be operated by coupled twist-grips and Bowden cables moving the quadrants above the main wheel.

Although it has full-size crank throws, the latter is appreciably smaller than that of a normal racing cycle, and appears to be a 24in wheel carrying a relatively thick tyre. Inboard of the left-hand crank is a bevel gear from which the drive is taken to a light-weight shaft running aft to the propeller. Close behind the main wheel this shaft vanishes into a tube of some 5in diameter, and the latter may either provide a relatively rigid location for bearings for a small-diameter shaft or it may be a thin-wall tube which actually rotates and forms the drive.

As emphasized last week, the Puffin is not an official de Havilland Aircraft project, although the company have provided every assistance. Nearly all the club members work at DH, and it is doubtful if any other candidate for the Kremer prize (£5,000 for a flight of one mile over a figure-of-eight course, starting and finishing at not less than 10ft altitude) has been able to draw upon so much talent, research equipment and hardware. By the end of last week the Puffin had shown beyond doubt that it is stable and fully controllable, and that it can be sustained in level flight. An attempt on the Kremer prize appears to be imminent.

J. H. "Jimmy" Phillips, a de Havilland Aircraft test pilot (head emergent), with S. C. Caliendi, the club's treasurer, making adjustments. Club secretary is Mr E. C. Clear Hill, and the chairman is J. C. Wimpenny, DH Aircraft deputy chief aerodynamicist

The missile launchings pictured on the right marked major milestones for their respective weapon systems. The Minuteman ICBM was successfully launched from its silo at Cape Canaveral for the first time on November 17, and an on-target impact was achieved 3,000 miles downrange. The Nike Zeus (far right) was launched from Point Mugu on its first long-range firing on November 16

Missiles and Spaceflight

CHRYSLER TO BUILD SATURN BOOSTER

A $200m contract for the construction of 20 S-1 first stages for the Saturn C-1 launch vehicle is being negotiated between the National Aeronautics and Space Administration and the Chrysler Corporation of Detroit. Check-out, test and launching is also included in the contract, and as part of the proposal the Aerojet-General Corporation will assist in static testing and provide launch support.

The 20 Chrysler-built boosters, to be made at NASA's Michoud plant near New Orleans, will follow ten prototype S-1s which are being built by NASA at the Marshall Space Flight Center at Huntsville. Chrysler's work at Michoud and elsewhere will be directed by the Marshall centre, and Chrysler personnel will be trained at the Marshall Fabrication and Assembly Division.

The advanced Saturn booster stage, the S-1B, will also be built at Michoud but by a different contractor. Five industrial proposals for this contract were received on November 8 and are being evaluated by NASA.

TIROS, NIMBUS, AEROS DISCUSSED

The International Meteorological Satellite Workshop organized jointly by the National Aeronautics and Space Administration and the US Weather Bureau ended in Washington on Wednesday of last week (November 22). Delegates from 27 nations had attended the meeting (described in *Flight* for November 16), with the Soviet Union, Poland and Czechoslovakia having accepted but failing to send representatives. In addition to familiarizing those present with details of the current Tiros meteorological satellite system, the programme included an account of the proposed future operational system which it is hoped to establish under the authority of the US Weather Bureau. Details of this proposed system are given on pages 846-7. The spacecraft involved in the three-phase scheme are Tiros, Nimbus and Aeros.

The primary instrumentation of Tiros comprises two wide-angle television cameras, and scanning and non-scanning radiation detectors. The satellite is spin-stabilized in space, i.e., its cameras are *not* continuously aimed at the Earth's surface. A typical orbit is at 450-500 miles altitude, inclined at approximately 48° to the equator.

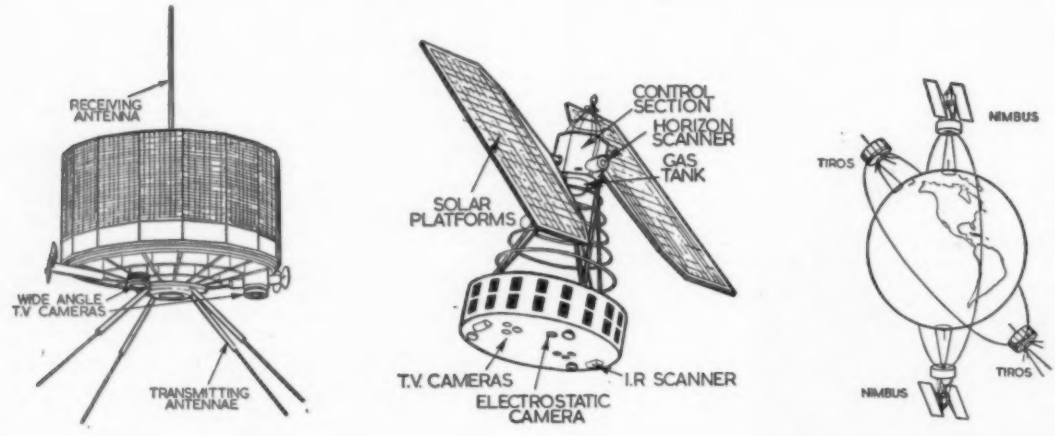
Nimbus will differ from Tiros in two major respects: the satellite will be placed in polar orbit at about 700 miles and it will be Earth-oriented, so that during a 24-hour period complete global coverage will be obtained. The same basic Nimbus spacecraft will be used both for initial R and D launches and for operational use.

The sensory system of Nimbus 1 will include a vidicon camera system to provide complete coverage of the globe; a radiation subsystem including high-resolution sensors for night-time cloud observations and low-resolution sensors for measurements of the Earth/atmosphere heat balance; and devices to measure solar radiation of importance to meteorology. Later Nimbus satellites may test new and improved sensors such as electrostatic tape cameras, spectrometers, image orthicon cameras and radar.

To supplement and amplify the data obtained from Nimbus satellites, NASA hopes to begin research and development next year on the Aeros family of weather satellites. Aeros would be similar in external appearance to Nimbus, but would be placed in equatorial orbit at the 24-hour, stationary or synchronous orbital height of 22,300 miles. Continuous observation of particular developing storm areas would here be the aim, and the instrumentation would probably include a variable-focus television camera in order to view the chosen areas in greater detail.

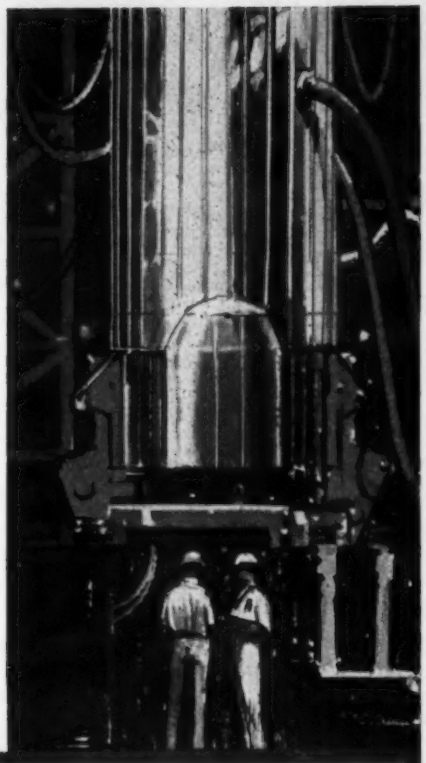
SOVIET ROCKETRY CLAIMS

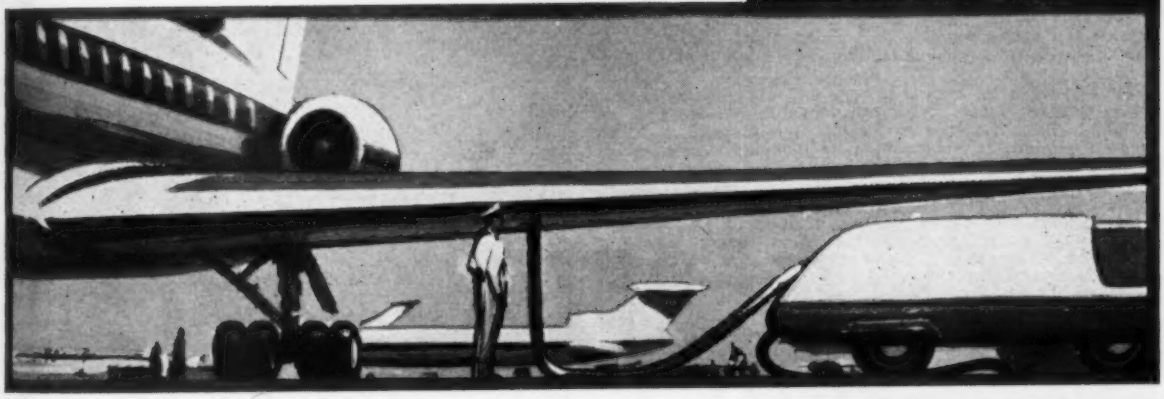
On November 19, Artillery Day in the Soviet Union, a number of radio and press announcements referred to the capabilities of Soviet rockets. In an article in *Red Star*, Chief Marshal of Artillery Sergei Varentsov, commander of Soviet rocket forces and artillery, said that "the fire-power of the Soviet armed forces has now attained



The main differences between the existing Tiros and the forthcoming Nimbus meteorological satellites are indicated in these sketches, which amplify the descriptions given in the news item above. The proposed US plan for an operational weather-satellite system is outlined on pages 846-7

Down go fuelling costs with the new A.W.E. fuel coupling





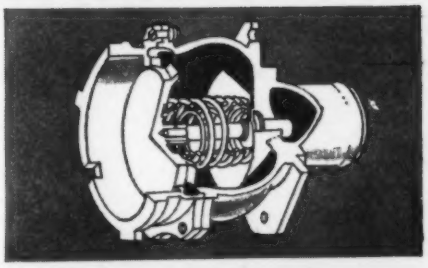
A new comprehensive range of aircraft mounted coupling units for aviation fuelling is now available ex stocks at A.W.E.

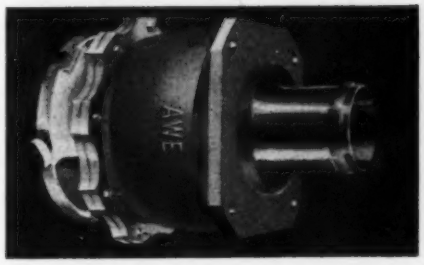
Combination of single seal and valve seat in the design reduces maintenance, spares holding, offers interchangeability of parts and provides a high degree of initial and operating economy.

The range comprises eight couplings with four types of outlets to each. Two sizes are available, either 1½ or 2½ inch outlets, all other parts being common to these. Special outlet connectors can be provided by arrangement.

Designed to Ministry of Aviation standards the couplings conform to International Standards Organisation and U.S. Military Standards requirements. The bayonet flange accommodates any of the approved kerosene or gasolene hose units.

A development of this design for handling H.T.P. is also available, complete with A.W.E. designed hose coupling.





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Missiles and Spaceflight . . .

a higher level than ever before." He stressed the tremendous role of rocket weapons with powerful atomic and thermo-nuclear warheads in this attainment.

"We must strengthen our defences, create powerful weapons, be vigilant and in a constant state of combat readiness," he continued, "The rocket forces and the artillery together with the other arms and services of the armed forces have in recent months greatly improved their combat readiness." Referring to the November 7 parade in Moscow and the rockets that were shown there Varentsov added: "It is quite obvious that only certain samples of Soviet rocket weapons were shown at the parade. Our armed forces have plenty of other, much bigger rockets too . . .

"Rockets have become now the main weapons of all the Soviet armed forces. Our rocket troops possess great power and mobility, and are able to manœuvre quickly and fire with great precision, regardless of weather and climatic conditions."

Red Star also printed an interview with Col-Gen of Artillery Kuleshov, who said that at the present time Moscow and the majority of large cities in the Soviet Union had a powerful rocket and radar defence and a network of fighter aerodromes. "We have also successfully solved the problem of the destruction of various rockets in flight," he added.

In an interview in the same paper, Engineer-Admiral Isachenkov said that a variety of types of submarines represented the main striking force of the Soviet Navy. The backbone of the submarine fleet itself consisted of atomic submarines whose range and endurance when submerged were practically unlimited. Soviet submarines were missile carriers, he stated, and the Soviet Navy now had a fleet of first-class rocket cruisers and rocket-carrying vessels armed with homing rockets. "Soviet ships can destroy enemy ships, in particular aircraft carriers, hundreds of kilometres away."

Col-Gen Tolubko, describing Soviet strategic rockets, pointed out that; "The existence of powerful nuclear rocket weapons has enabled the Soviet country to create a new arm—the strategic rocket troops . . . We can add to the above that we have even more powerful nuclear weapons and their number is considerably larger than calculated by American experts . . . Our ballistic rockets have proved themselves so well that nobody can doubt their ability to rise and deliver every sort of missile to any point on earth.

F-1 PROGRESS

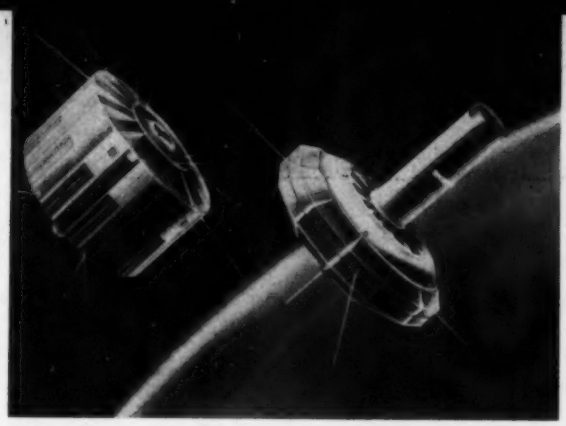
"We have had 40 F-1 engine firings at Edwards Air Force Base to date, without major mishap. In fact, the engine is performing very nicely," George P. Sutton, manager of long-range planning for the Rocketdyne Division of North American Aviation, told an audience in Dayton, Ohio, on November 8. "Usually, in a development programme of this kind, we have some spectacular fires, but so far there have been only very minor problems with the F-1. We also have fired the engine's thrust chamber over 100 times with good results," Mr Sutton declared in his talk on the F-1 engine programme before a joint meeting of the Institute of the Aerospace Sciences and the American Rocket Society.

In his review of the F-1 programme (a correspondent writes) Mr Sutton indicated that the injector was one of the more troublesome features of the engine in the very early stages of development. "It took eight months to come up with a stable injector," he reported. He added that the turbopump also required more design and development time than anticipated, but otherwise performance of each component was about as expected. The first turbopump for the F-1 was not fired until January of 1961, and the engine was given its first test on February 10 at Edwards Air Force Base when it developed 1,550,000lb of thrust. Since then it has developed 1,640,000lb of thrust. Prime purpose of the first tests is checking start-up and shut-down performance.

Pre-flight rating tests that include some 18,000sec of actual firing time are scheduled for completion early in 1963, Mr Sutton declared.

The Rocketdyne engineer came out strongly for keeping space research in a civilian agency and out of the military, and for going to the Moon "in one fell swoop" rather than first building an intermediate station in low orbit and firing a manned capsule to the Moon from there.

His reason for concentrating space research in a civilian agency apart from the Department of Defense was fear that space research would lose its priority if it came under the military, which has so many other projects that would compete for attention and financial support. He also said that it would take longer to develop the larger vehicles that can make a round-trip to the Moon in one step, than to use existing vehicles to begin establishing a secondary platform in space from which a Moon vehicle could be launched. But we knew little about rendezvous techniques, and "it is hard enough for us to assemble space vehicles on the ground without having to do it in space."



Artist's impression of Transit 4B experimental navigation satellite (left) and TRAAC (Transit research and attitude control) satellite, launched together by Thor-AbleStar from Cape Canaveral on November 15 and reported in last week's issue

Mr Sutton therefore strongly supported the Saturn and Nova programme (in which his company has a large stake) to get a man to the Moon. The Saturn S-1B will use the F-1 engine, and NASA is expected to let a contract for this vehicle very soon. The S-1B will be built in Michaud, Louisiana, the payload for the vehicle will be worked out at the new NASA manned spaceflight centre to be built near Houston, Texas, and the vehicle will be fired from Cape Canaveral.

But, for the manned lunar capsule, NASA is studying the huge Nova vehicle that would use 8 F-1s in the first stage to develop 12 million pounds of thrust—and would spew forth exhaust flames 1,200ft long. Such a vehicle, with almost any of a variety of upper stages, could put a 400,000lb vehicle into a low orbit of 300 miles. It could put a smaller payload of 170,000lb into an escape mission so that it would land on the Moon with a weight of 156,000lb, and while returning to Earth the capsule would have a weight of 10,000-15,000lb upon re-entry. Most of the weight loss on the mission would result from the consumption of fuel, Mr Sutton stated.

He noted that the Department of Defense and NASA currently are deciding whether to go ahead with the eight-engine Nova vehicle, or to pursue the rendezvous idea for getting to the Moon. In answer to a question, Mr Sutton said that recovery of large boosters intact was technically feasible, but unless such a booster could be launched and re-launched many times after recovery, the economics of the idea simply were against it.

Responding to another question, Mr Sutton declared that preliminary studies by Rocketdyne indicated that single-chamber rockets with thrust ratings up to 15 million pounds were feasible. "Other companies have made similar studies and say single-chamber rockets developing 40 million pounds of thrust are feasible." However, no detailed study of the problems that might be encountered in making such large single-chamber rockets had been undertaken by anyone in the West, so far as Mr Sutton knew.

Completion of the series of four Skylark firings from Woomera in which US payloads were carried was announced in Adelaide on November 22. Data obtained have been sent to the USA for analysis.

A USAF announcement from Point Arguello on November 22 stated "A satellite employing an Atlas-Agena B booster combination was successfully launched today. The satellite is carrying a number of classified test components." The satellite is believed to be one of the Samos series of experimental reconnaissance spacecraft.

Launches of two "3-ton Agatha rockets" on November 13 and 17 from the French base at Hammaguir, in the Sahara, were announced in Paris on November 24. The tests were stated to be part of "research on a satellite-launcher expected to be ready in the next four years." Nose-cones and payloads were recovered after achieving a height of 64km.

The RL-10 liquid hydrogen/liquid oxygen rocket engine, intended for Centaur and Saturn vehicles, has completed successful pre-flight test firings, according to a National Aeronautics and Space Administration announcement on November 19. The engine has been developed by Pratt & Whitney.

A Moscow report on November 18 quoted Prof Stanyukovich, believed to be connected with the design of Soviet sputniks, as saying that "Soviet scientists are now working on a theory regarding rockets that will start for space without any explosive blast. Solar energy will be used instead." No details were given except that, in his opinion, space-ships equipped with solar engines could make any trip within the solar system and visit any planet in the system.

Missiles and Spaceflight . . .

WEATHER SATELLITES: OPERATIONAL SYSTEM PLANNED

TWO Nimbus satellites are to be launched by the National Aeronautics and Space Administration next year in the opening phase of the United States' operational meteorological satellite system. In parallel with this, further launches of Tiros experimental weather satellites are planned so that, at any time between now and the end of 1962, there will be one Tiros in orbit and transmitting data.

The three Tiros satellites launched to date have been so successful—some 70,000 useful cloud photographs had been obtained up to the beginning of this month—that one might almost assume that an operational system already exists. Certainly, as reported previously in *Flight*, Tiros weather data is already being used operationally on an international basis. "The tremendous Tiros coverage during the hurricane season this year," Mr Herbert Butler of Goddard Space Flight Center told *Flight* in Washington last month, "has proved the value of meteorological satellites, not only in tracking but also in providing early warning."

But Tiros, notwithstanding the welcome bonus of operational information, remains a research and development project, and the NASA scientists concerned have consistently refused to compromise the R and D mission for the sake of operational aspects or to meet a scheduled date. "God helps those who do their homework," as Mr Butler phrased it, and the Goddard Space Flight Center philosophy of making sure by rigorous ground-

OPERATIONAL METEOROLOGICAL SATELLITE SYSTEM: FLIGHT SCHEDULE

	1962	1963	1964	1965	1966	1967 onwards
Phase 1: One Nimbus in orbit most of the time	2 Nimbus* 1 Back-up	2 Nimbus* 1 Nimbus 1 Back-up				
Phase 2: One Nimbus in orbit continuously, a second in orbit most of the time. Initial use of data from R&D Aeros			3 Nimbus 1 Back-up 1 Aeros*	3 Nimbus 1 Back-up 2 Aeros*		
Phase 3: Two Nimbus in orbit continuously					3 Nimbus 1 Back-up →	Steady flow of Nimbus launches
One Aeros(R&D) in orbit part of the time					2 Aeros* →	Continue R&D operations; ally

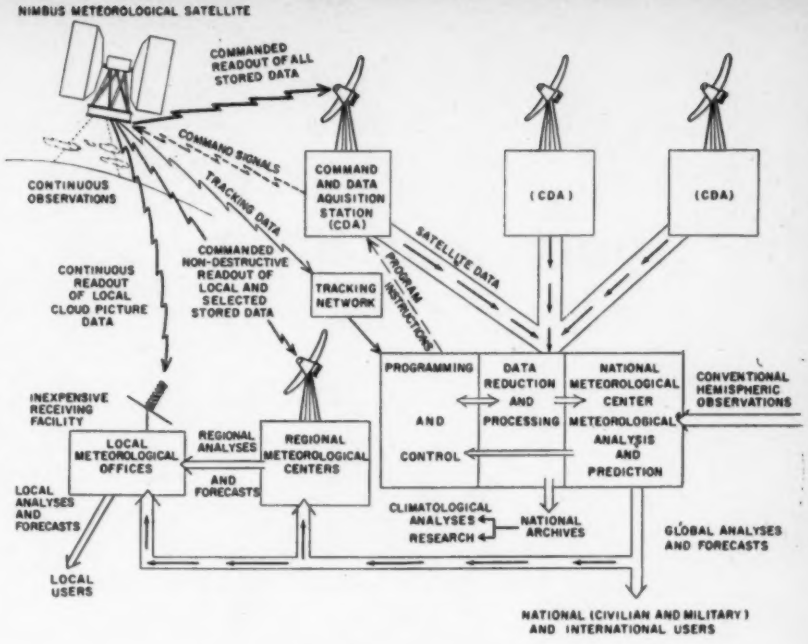
* Included in present NASA research and development planning.

COMPONENTS OF THE OPERATIONAL METEOROLOGICAL SATELLITE SYSTEM

Components	Phases		
	(1) July 1962-December 1963	(2) January 1964-December 1965	(3) January 1966→
Satellite System	One Nimbus in orbit most of the time with 600 mile, polar retrograde, high noon orbit.	One Nimbus continuously in orbit, a second Nimbus in orbit most of the time (orbits as in Phase 1). One Aeros* part of the time in an equatorial "stationary" orbit.	Two Nimbus continuously in orbit. One Aeros* in orbit part of the time.
Observational Capability	Global cloud cover. Temperature of radiating surfaces. Global heat balance measurements. Direct readout of daytime cloud pictures. Qualitative estimates of cloud types and heights and wind circulation patterns.	Frequency of observations doubled over those of Phase 1 *most* of the time. Improved cloud cover details over limited, remote but programable areas. Direct readout of nighttime cloud cover. Hourly cloud cover pictures over most of Western Hemisphere when Aeros satellites are operative.*	Frequency of observations doubled over those of Phase 1 *all* of the time. Increased reliability of hourly cloud pictures from Aeros.* Additional observations such as atmospheric mean temperatures and experimental wind measurements that may evolve from the NASA R & D effort.
Spacecraft Launches	Five† Nimbus launches with two back-ups in the event of premature failure. Launches at approximately six-month intervals.	Six Nimbus launches with two back-ups. Two Aeros launches.*	Three Nimbus with one back-up per year. Increased reliability of both spacecraft and launch vehicles anticipated. Two Aeros launches* per year.
Launch Vehicles and Ground Support	Thor-Agena B at Pacific Missile Range (PMR).	Thor-Agena B for Nimbus at PMR. Centaur for Aeros* at Atlantic Missile Range	Same as Phase 2, except that it may be necessary to use another launch vehicle to replace the phased-out Thor-Agena B.
Tracking	Minitrack.	Minitrack or other national system.	Same as Phase 2.
Command and Data Acquisition Stations (CDAs)	Fairbanks, Alaska. East Coast United States station. Northwestern European station.	Fairbanks, Alaska. East Coast United States or northeastern North American station. Northwestern European station. East Coast United States station for receiving Aeros observations.*	Same as Phase 2.
Special Communications for Data Transfer	Wide band links between North American CDAs and the National Meteorological Center (NMC). Narrow band (facsimile quality) link between Europe and NMC.	Width of communication bands will be doubled to handle the increased kinds and frequency of observations.	Same as Phase 2 except that communication satellites would probably be used, when available.
Direct Readout	If technically feasible, installation of relatively inexpensive receiving and recording equipment at local weather stations would enable them to receive cloud pictures, for their area of local interest, directly from the satellite.	In addition to the Phase 1 direct readout, it is anticipated that a nondestructive readout capability of stored data for use by major regional centres may become available during this period. This will permit these centres to obtain all observational data from the several orbits passing within their receiving ranges each day.	Same as Phase 2 with regional readouts being fully implemented.
Data Analysis and Distribution	Data reduction, processing and analysis at NMC using combination of manual and automatic methods. Analyses will consist of cloud depictions, analyses showing relationship between satellite and conventional data as well as conventional analyses based on the additional satellite information. Existing domestic and international meteorological circuits will be used initially with a review of their adequacy in terms of the increased data and analyses which will result from this plan.	The main change will be towards more fully automatic processing methods. New types of analyses and presentations will be the outgrowth of research and development on the new and more extensive data.	Fully automatic processing and analysis is to be expected by this phase. Means for processing and continuously displaying the data from Aeros will be developed. National dissemination will be by improved facsimile circuits. Communication satellite relay between international centres may be used.

* The NOMSS will make maximum use of this data from the NASA R & D Aeros satellites prior to incorporation of Aeros in the operational system at some future date.
† Four of these are scheduled NASA R & D launches.

Data flow and processing, as envisaged by the US Panel on Operational Meteorological Satellites



testing that one has a good satellite before flying it has clearly paid off in the three straight successes (on April 1, 1960; November 23, 1960 and July 12, 1961) in the Tiros series.

The proposed plan for an operational weather-satellite system which is described and illustrated here has been prepared for the US Government by the Panel on Operation Meteorological Satellites (POMS). On this panel, working under the auspices of the National Co-ordinating Committee for Aviation Meteorology, were represented the US Army, Navy and Air Force; the Weather Bureau of the Department of Commerce; the Federal Aviation Agency and NASA. The main spacecraft involved are Tiros, Nimbus and Aeros, all of which are described in a newa item on page 844. The Tiros satellites, already proven in basic design but with a few detail changes, would form an introduction both operationally and for training purposes to Phase 1 of the programme.

The main elements in the POMS plan are outlined in the tables and diagrams on these two pages. As the system attains full operational status a target of 90-95 per cent reliability would be established, and the average satellite lifetime would approach six months by Phase 2 of the programme. Reliability of the system would be improved in Phase 3 by what the report calls a quick launch capability.

The co-ordinating committee's report contains five main conclusions and 12 recommendations. The conclusions are:—

(1) Continuous world-wide meteorological coverage is now within the grasp of any nation, or group of nations, possessing the necessary interest, skills and resources to develop an operational meteorological satellite system.

(2) Based on the solid accomplishments of its research and development programme, the United States could now undertake the establishment of an operational meteorological satellite system with every confidence of success. The system could become fully operational before the middle of this decade, evolving from the flight hardware developed by the NASA research and development programme.

(3) An operational meteorological satellite system would constitute an extremely powerful complement to the present observational networks. It would provide coverage of important geographic areas not now adequately observed. Furthermore, it would make available new types of meteorological observations which would improve our understanding of meteorological events.

(4) Weather exerts a tremendous influence on all mankind. From its careful observation and study can come untold benefits, including improved weather analyses and forecasts over the entire Earth. The potential savings in life, property, produce, natural resources, and even in personal convenience are difficult to assess. That a meteorological satellite system can make a major contribution is beyond doubt.

(5) It is both possible and clearly in the national interest to satisfy the requirements of all the US weather services for meteorological satellite observations with a single, national system. The same system could provide major services to the international community of nations.

The report goes on to make the following recommendations:—

(1) That the United States undertake to develop a national operational meteorological satellite system at the earliest possible date.

(2) That this document be accepted as the basis for initial planning and implementation of such a system.

(3) That funds be made available in early fiscal year 1962 to begin implementation of the system.

(4) That assignment of management responsibility for the national operational meteorological satellite system be made at the earliest possible date, and that this responsibility be placed with the US Weather Bureau of the Department of Commerce. That appropriate legislative changes be made to permit the Department of Commerce to effectively carry out this responsibility.

(5) That the US Weather Bureau create a new organizational segment to manage the operational satellite system.

(6) That the Department of Commerce contract with the National Aeronautics and Space Administration to develop and/or procure for the US Weather Bureau the spacecraft, launch vehicles and ground support equipment and to accomplish the launchings. Further, that the NASA shall participate in such post-launch activities as command and data acquisition, as required by the inter-relationship of ground equipment and spacecraft.

(7) That the satellite data users participate in the staffing of the operational system organization through assignment of appropriate personnel.

(8) That the operational system evolve from the NASA research and development programme, initially making use of the Nimbus satellite now under development, and continue to draw on new developments resulting from the research and development programme. That the Aeros satellite be supported for eventual incorporation into the operational system.

(9) That the Tiros programme be extended to provide some measure of operational capability prior to the first Nimbus launch.

(10) That consideration be given to the eventual replacement of ground communications by satellite data relay.

(11) That immediate engineering attention be directed to the following long-range problem areas:—

(*a*) Possible replacements for the Thor-Agena B launch vehicle if it is to be made unavailable by early Thor phase-out.

(*b*) Optimum number and location of command and data acquisition stations.

(12) That foreign countries be phased into the programme at an early enough date to allow them adequate time to develop their roles.

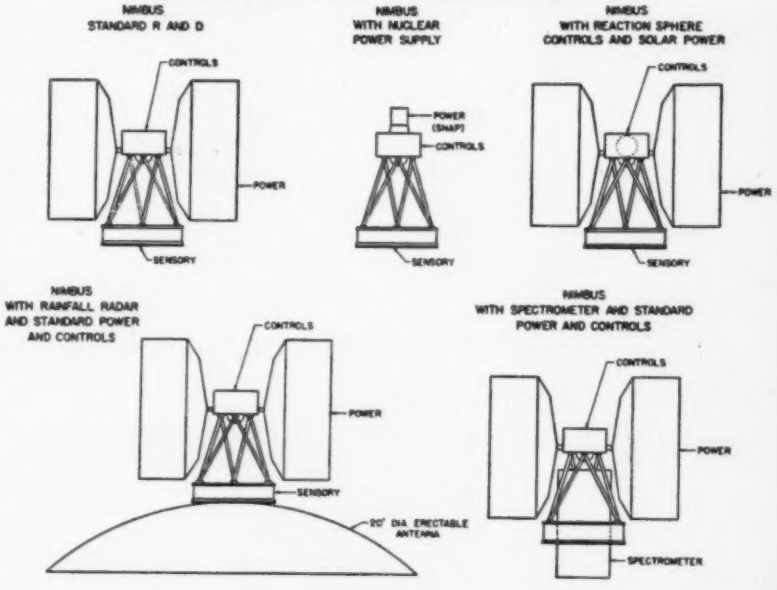
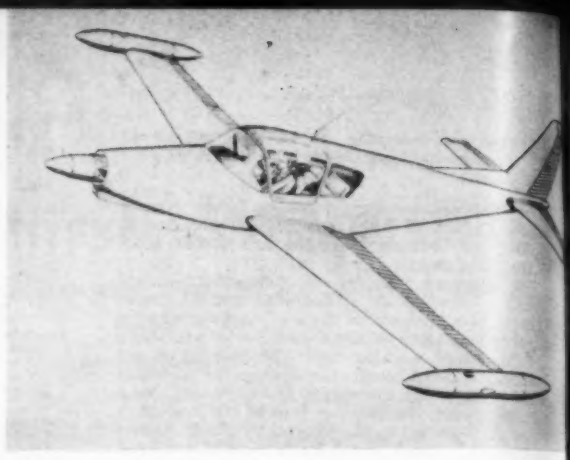


Illustration of the flexibility and growth potential of the basic Nimbus meteorological satellite design



Artist's impression of the joint French-Italian Antilope four-seat executive aircraft powered by a Turboméca Astazou 2 turboprop. Sipa and Procaer, as reported last week, are the companies involved

Sport and Business

THE SEAPLANE CLUB hopes to begin operations by training a number of instructors on a Tiger Moth floatplane early next year at Lee-on-Solent. Lord Douglas of Kirtleside has agreed to become president of the club, with Dr Reginald Bennett as vice-president. Dr Bennett is commander of the Lee-on-Solent Sailing Club. Subscriptions for the Seaplane Club are £8 p.a. (pilot members), £4 p.a. (non-pilot members) and £50 (life members). The club secretary is Miss Ann Warren, of 35 West Hill, Sanderstead, Surrey.

NEW HEADQUARTERS for McAlpine Aviation have now been opened at Luton Airport. They comprise a 240ft × 120ft hangar, offices, crew rooms, workshops and rest rooms. The facilities include the first full repair, overhaul and installation service for aircraft radio and navigational-aid equipment to be based at Luton. Mr Ray Young, manager of McAlpine Aviation, has stated: "Our new radio section should prove invaluable to executive aircraft operators. We are providing particular specialist services for owners and operators of such aircraft as Piaggios, Helios, Cessnas, Aero Commanders, Pipers, Doves, Herons and Dakotas."

A PROBABLE DEMAND for 500 light twin-engined business and personal aircraft and 1,000 four-seat single-engined machines by 1967, and 1,000 and 2,000 respectively by 1972, was forecast by Mr Peter Masefield in his lecture "Civil Aviation—a Forward Appraisal" before the Derby Branch of the Royal Aeronautical Society on November 6. In addition to these UK totals, large export sales were expected.

Speaking of progress with the Beagle B.206, Mr Masefield said that over 50 hours of test flying had been completed. The aircraft was making approaches at under 50kt and was cruising at over 200kt. Production B.206s would have the wingspan increased by 5ft.

During the discussion, one speaker suggested that safe all-weather operation of business aircraft would demand fully qualified pilots, and airfields with full aids. Where would the airfields come from? Mr Masefield agreed that the aircraft would need professional pilots and full radio equipment. Good low-speed characteristics would greatly help all-weather operation. He took a "cautiously optimistic view" about the provision of airfields in future.

SINCE we last reported on flying activities at Baginton, there have been further changes at Coventry Aeroplane Club. After a brief interlude during which flying was provided by Oxford Aviation Ltd, the club are again operating their own Auster Autocrat and Aiglet Trainer. Flying rates must be the lowest in the country at £2 14s and £3 an hour, for which they have to thank the enthusiastic Mr C. M. Woodhams, their president. Mr Woodhams has made an outright gift of a large sum of money to enable members to fly at these rates —and with every success, for the aircraft are fully booked-up for weekends ahead. The club is also lucky in having on its strength John Hill and Norman Slater, among other experienced instructors, who are prepared to devote their Saturdays and Sundays to giving tuition. Consequently the situation is now very healthy indeed and the club committee is actively investigating the possibility of adding another aircraft to the fleet.

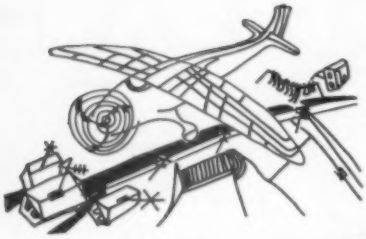
ULSTER FLYING CLUB (1961) LTD became operational at Newtownards Airport, near Belfast, last month. A flying display followed the official opening by Gp Capt Douglas Bader, in which the Ulster club's Tiger Moth G-AOVR and Aircoupes G-AMRD and G-ARME (on hire from Air Rent) participated. "The Tiger gained height and eventually unloaded an intrepid parachutist," a Belfast correspondent writes, "who landed with great accuracy in a drainage canal on the perimeter . . . The Irish Parachute Club completed the display by again demonstrating their members' preference for water landings, two out of three who jumped from a Rapide landing in Strangford Lough . . ."

A MAP AND LIST of refuelling facilities in the British Isles has been produced for the benefit of light-aircraft pilots by Shell-Mex and B.P. Ltd. Copies are available free from the company at Shell-Mex House, Strand, London WC2.

BRUSH AND PEN AT THE KRONFELD CLUB . . .

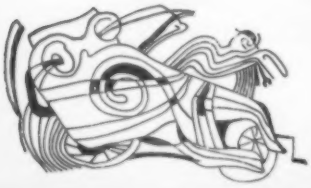
Over 50 paintings and sketches were shown at the Kronfeld Club's recent exhibition of aeronautical art. Prizewinners included "Mossy Preston's B.E.2E over Brooklands" (reproduced here) by Harry Cooper, "Bungie Launch" by Ann Welch, and "Night Attack" by Ken Tilson

JOHN BLAKE: Bellanca Racer



FERELYTH WILLS: Powered Flight

FERELYTH WILLS: Tow-car Trouble



HARRY COOPER: Mossy Preston's B.E.2E over Brooklands

ANN WELCH: Finishing Line

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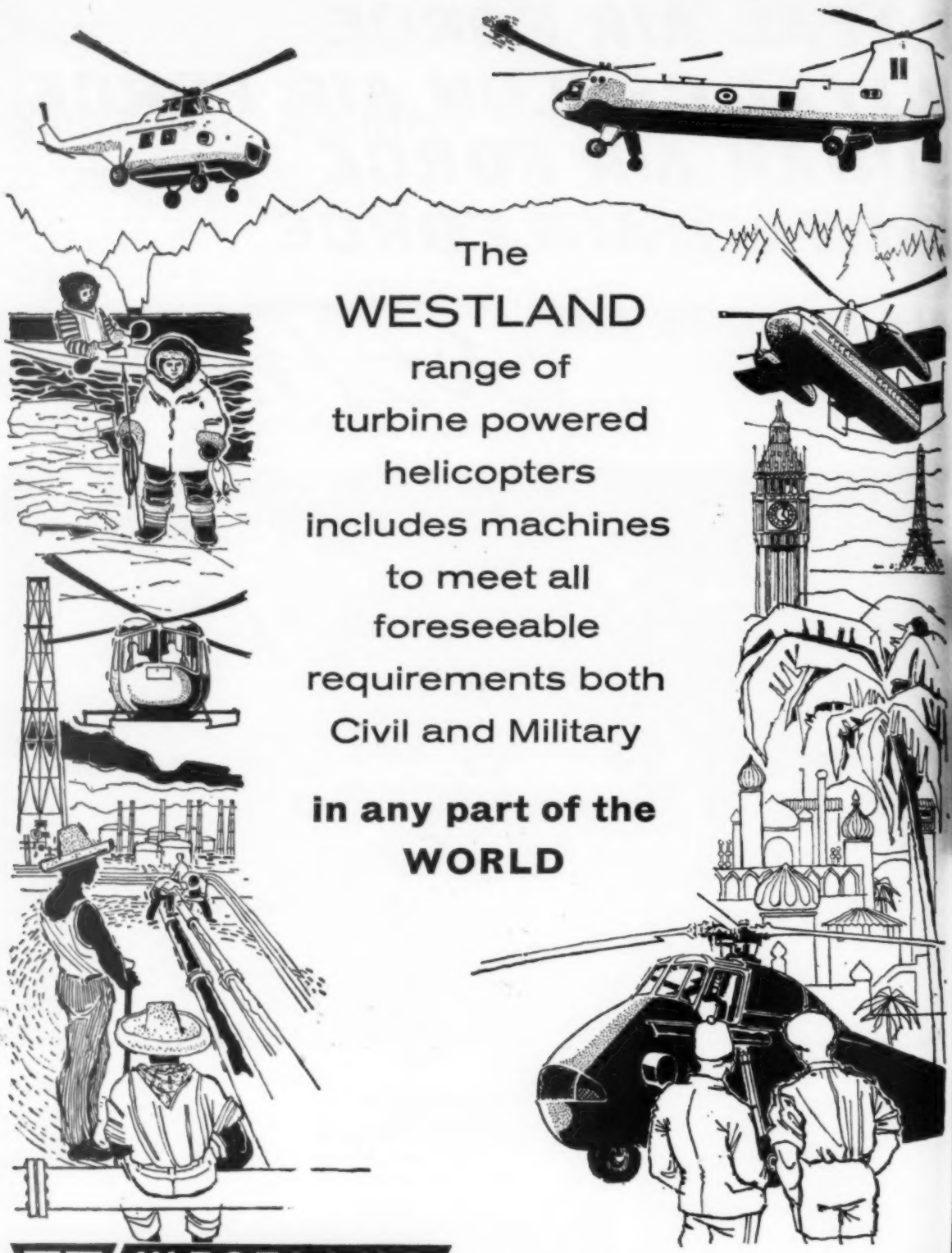

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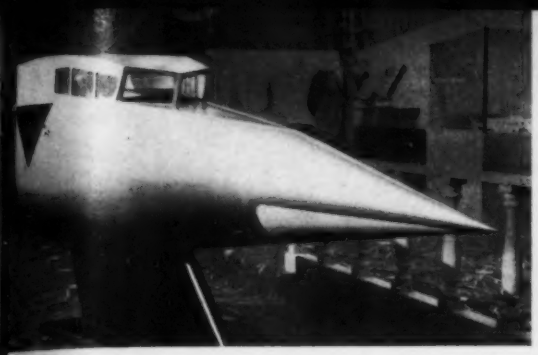


In a supersonic airliner not only the powerplants need variable geometry. These photographs reveal the proposed forward fuselage of the Douglas SST, showing how the upper section ahead of the flight deck folds down to provide forward visibility for take-off and landing

AFTER THE DC-8

Further Details of the Douglas 2229

DOUGLAS were the originators of the idea of speed-plateaux in air transport. After helping to establish plateaux at about 180, 300 and 550 m.p.h., the company have set their sights on 2,000 m.p.h. No major US aircraft company has publicly disagreed with the belief that the cruising Mach number of the next generation of airliners should be not less than three, and Douglas Aircraft have subscribed to this belief for some two years.

Although the company could not themselves finance the design and manufacture of such an aircraft, they have conducted extensive research into a transatlantic M3 design with the company number of Model 2229. It is not unknown for a company to publish illustrations of "supersonic airliners" which have never been the subject of serious research, either in order to impress the gullible public or to mislead competitors. But the Douglas 2229 is a serious project, and it is possible on this page to comment upon details revealed in model form at the recent meeting in Los Angeles of the Experimental Test Pilots' Association.

Gross weight of the 2229 would be some 400,000lb; the fuselage would be 200ft long, and with the wing-tips fully spread the span would be about 100ft. As might be expected, the Eggers' momentum theory of compression lift is utilized. In the B-70 bomber it is possible to dispense with a fuselage above the wing, and thus employ the ideal wing/half-body combination. This cannot be done in a transport, where the pressurized passenger cabin must extend as far fore and aft as possible, but the 2229 has every other feature aimed at raising the cruising lift/drag ratio. At full speed the outermost 20ft of each wing is folded downwards in order to increase the favourable pressure-distribution beneath the wing created by the leading-edge shock and the supersonic compression alongside the widening propulsion box.

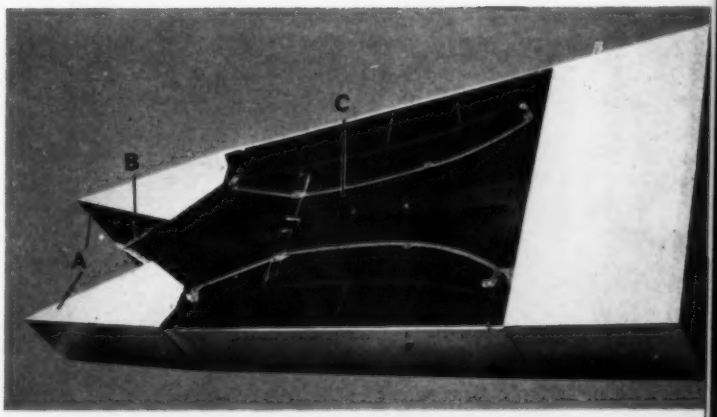
Details of the latter are shown in the two lower photographs. The four engines are turbojets, each with a mass-flow of some 450lb/sec and possibly mild augmentation in the tailpipe. They are mounted at the rear of an inlet-duct box extending forwards to the leading edge of the wing on each side of the aircraft, the distance from the knife-edges A to the propelling nozzles H being some 80ft.

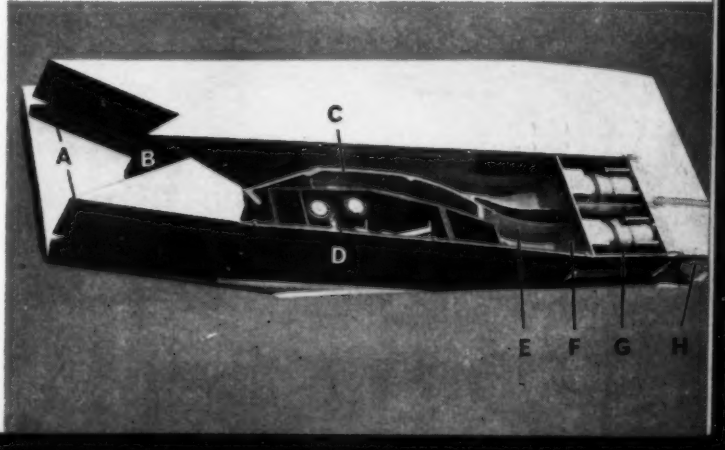
As might be expected, the intakes are two-dimensional, and in the exhibited models the propelling nozzles were likewise. In the present state of the art the development of an infinitely variable two-dimensional intake and exhaust system is merely very difficult, whereas an infinitely variable circular arrangement of reasonable weight and simplicity is practically impossible.

So great is the root chord of the wing that, together with the delta foreplanes, it covers the whole usable fuselage and must pose problems in passenger embarkation and emergency escape. The cross-section is conventional, although Douglas have investigated twin pressurized tubes side-by-side. The flight deck in a 2,000 m.p.h. aeroplane poses many problems which can be solved in various ways. Douglas have located it well back from the nose in order to achieve satisfactory width and depth. This also places the side windows almost parallel to the line of flight, resulting in relatively mild kinetic heating. The front windows are faired off in flight, as illustrated above.

Douglas would certainly like to build such an aeroplane; but so would all the other West Coast giants, and there is probably going to be room for only one such design. This means that the US industry will have to suffer all the pains of realignments and consortiums which have increasingly become the lot of the European manufacturer. Time will show whether the renowned DC family has already come to an end.

This model of the Douglas 2229 portrays the cruise configuration, with the wing - tips turned downwards





In order to achieve maximum efficiency under all flight conditions, a supersonic airliner must have a complicated propulsion system, with infinitely variable intake, duct and exhaust profiles. These photographs illustrate the broad configuration suggested by Douglas: A, shock wedges; B, intake doors (shown closed for ditching); C, three-section, variable-profile duct wall; D, retracted main bogie; E, duct splitter; F, engine intakes; G, engines; H, rectangular variable nozzle

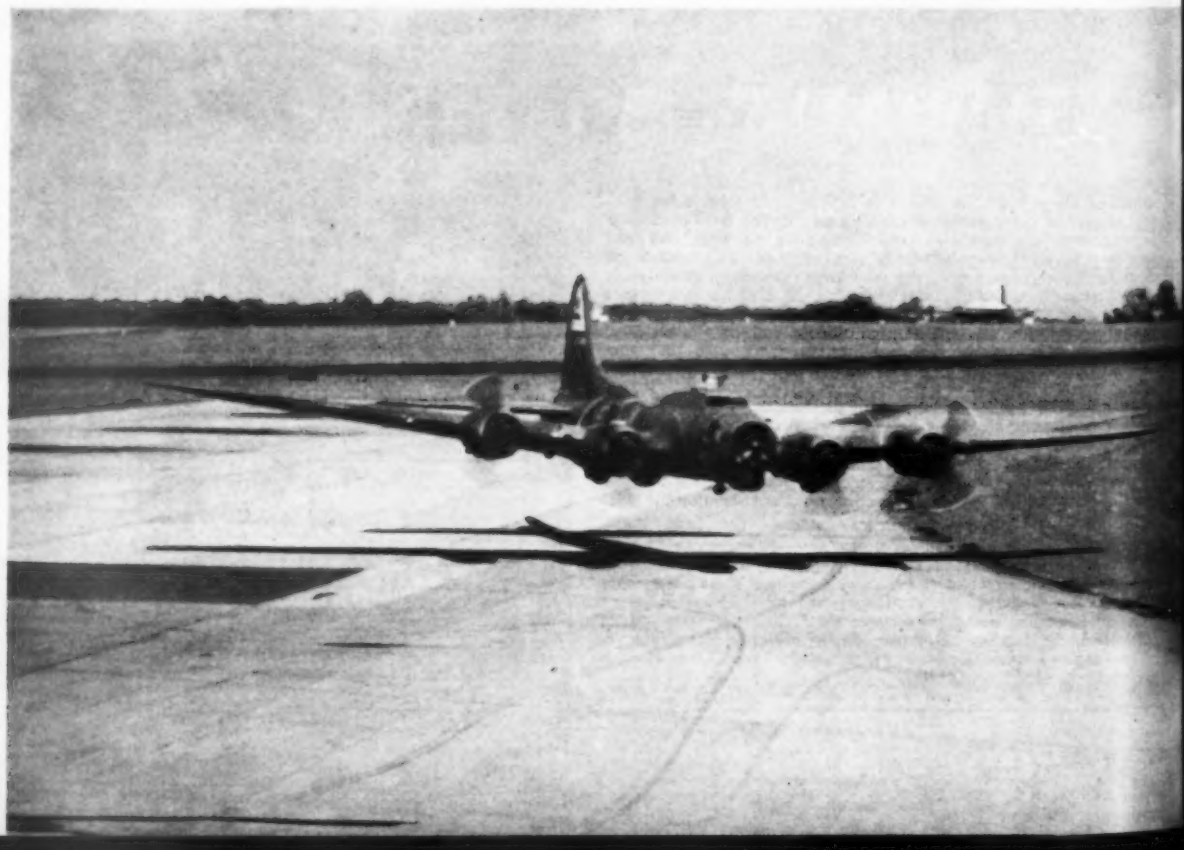
DISCOVER three B-17s in America; fly them across the Atlantic to England and give them the wartime markings of the 8th Air Force, USAAC; put them on location at Bovingdon for flying sequences in the film Columbia Pictures are making of John Hersey's novel *The War Lover*, the action of which is set in a B-17 wing in England in 1944 and which was published in this country by Hamish Hamilton in 1959. That is the story behind these pictures, in which the flying is being done by Capt John Crewdson, managing director of Film Aviation Services, who bought the B-17s and ferried them across—an operation which was not without its epic quality, with weather difficulties and engine troubles. Stars of the film (apart from the Fortresses) are Shirley Anne Field, Robert Wagner and Steve McQueen, and it is being directed by Philip Leacock. Quotations from John Hersey's novel caption the photographs reproduced here

Capt Crewdson and two film extras with "Expendable VI," which "had a rough time coming ho with the Hun using air-launched rockets again"

"We saw 'Angel Tread,' Colonel Bins' ship, lumber slowly out from his hardstand . . ."

B-17s FLY AGAIN: FILMING HE

"But Buzz wasn't satisfied. He took a vicious pass at the tower, shouldered into the traffic patter



"We had more than an hour ahead of us of climbing and forming up"

...MINCHE WAR LOVER" AT BOVINGDON

Cunard Eagle Western

PART 2: IMPRESSIONS OF A BRITISH INDEPENDENT'S OPERATIONS IN THE WESTERN HEMISPHERE

By the Air Transport Editor "FLIGHT" PHOTOGRAPHS

LAST week's licensing setback for Cunard Eagle, who will not now be granted their North Atlantic route, is discussed on page 859. Meanwhile life goes on for this airline, which must now seek to expand in other directions. In "Flight" for November 2 the author described the commercial and political background to Cunard Eagle's operations linking Bermuda and the Bahamas with the USA. Here he recounts some more personal impressions of the airline and the places it serves.

TWELVE hours after leaving London the soothing note of our Proteus engines changed as we began the drift-down to Bermuda. The cabin staff had awoken us with a glass of fresh iced orange juice—just what passengers need after a night in an airliner.

A night in a Cunard Eagle Britannia is no more restful than one passed in any other modern aircraft; but at least the cabin staff do not start the day with a hearty hospital-type reveille, clipping on the tables before the customers have uncrumpled themselves. An independent making its début in first-class international air transport will obviously do its utmost to impress; but I can truthfully say that I did not expect such polished and professional cabin service, right down to the smallest detail, as this. The standard of service is as professional in every detail as that of BOAC, which is saying something.

The captain was telling us about the weather (rain) and the temperature (70°F) in Bermuda, and the fact that we would be landing four minutes behind schedule. On a night flight over the ocean there is no opportunity for public relations on the passenger-address system, something about which Cunard Eagle crews are pretty conscientious in waking hours, as I was to discover on subsequent flights. It does not do to disturb a sleeping cabin, tempting though it must be to tell passengers to watch the dawn that breaks so beautifully and so slowly on a westbound flight high over the Atlantic. The sunrise that some of us were awake to see on this particular morning, had it been painted on canvas, would have been rejected by the Royal Academy as preposterous. Pitch blackness, pricked by the piercing light of a lone planet, melted into bands of blue, turquoise, green, yellow, orange and red, down into the blackness of the ocean's waste.

Watching the Landing

After breakfast Capt Gage allowed my request to go up front to watch the landing. We were holding at 10,000ft because of other inbound traffic, a Guest Mexicana Comet 4C from Mexico City. The fuel gauges added up to 4,600lb/hr, but we had more than 2½ hours' fuel in hand—the company's minimum reserve for Bermuda, which is a long way from a diversion airfield. We had used the high-speed cruise technique rather than the long-range cruise; this is standard company practice, the cost of the additional fuel being far outweighed by the saving in airframe and engine hours.

A stewardess came up to report that the cabin was all in order. Capt Williams, the other skipper in the 24-hr crew employed on the London - Miami route, was making his approach on instruments. Mr Pilcher, the engineer officer, was in charge of the throttles, and Mr Dillon, the first officer, watched out for the moment of transition.

All that could be seen through the windscreen was the contest between the wipers and the rain. To a passenger who had been sitting in the cabin for 12 hours we could have been anywhere—Hong Kong, East Acton, anywhere.

Suddenly, there was the green island of Bermuda, its reefs and coral-pink beaches lapped by seas, rough today, of purest blue. And there was Kindley Field, US sovereign territory in a British Colony, the island's civil airport as well as a USAF base. A straight-in approach, past scores of parked KC-97s and F-100s, to a touch-down almost as imperceptible as Capt Gage's back at Gander. That one had been so good that we literally did not know, until the propellers went into reverse, that we were down.

The Britannia was going on to Nassau and Miami, where the crew would spend a week before taking the next week's flight back to London. I was to join this flight at Miami, after having a look round the Cunard Eagle parishes in Bermuda, New York, and Nassau.

The Viscount approaches Miami Beach . . .

Cunard Eagle's man in Bermuda is Mr H. P. Snelling, general manager of the airline's western hemisphere division, with responsibility also for the Bahamas. We talked in his office at the airport with the chief engineer, Mr J. Colthrup; the chief pilot, Capt M. Gudmundsson; Mr C. Martin, reservations manager, Bermuda; and the chief stewardess, Bermuda, Miss E. Smith.

The whole Cunard Eagle operation in the western hemisphere has Bermuda as its hub, with spokes going out to London, New York, Nassau and Miami. It is here that the airline's two ex-Cubana Viscount 755s, both VR- registered in Bermuda, are maintained. The operations are scheduled so that the two aircraft are interchanged each week between the Bermuda - New York service (daily or twice-daily) and the Nassau - Miami service (four times daily). One aircraft is at Bermuda every day of the week, except one, from 8 a.m. until 4.30 p.m. undergoing checks, 1, 2 or 3 according to the progressive-maintenance schedule. Checks 4 are done every 1,900hr at London, this being arranged to fall before the peak season, which is Easter.

A utilization of some 2,500hr a year is extracted from each Viscount. There are 20 engineering staff, seven pilots and ten stewardesses based in Bermuda, and six pilots and ten stewardesses in Miami. Of the total of 13 pilots, six are first officers; each Viscount is crewed by two pilots and three stewardesses. Most of the pilots are British, and all the stewardesses are British or Bermudian.

The mid-Atlantic route has now been operated for just over a year, although the extension from Nassau to Miami was not introduced until February 1961. There was a dispute with Bahamas Airways over Cunard Eagle's rights to carry Nassau - Miami sector traffic on this Britannia service, supplementary to that carried on the established Viscount shuttles. This little argument between the Colony's two designated airlines was settled after a hearing before the Bahamas Air Licensing Authority, a settlement which led to a long overdue non-aggression pact between the two companies (see pages 734-735 of *Flight* for November 9).

The Britannia route between London and Miami was Cunard Eagle's first break into the field of long-haul international scheduled services. It is a highly seasonal market, traffic flows following the same sort of pattern as on the North Atlantic. First-class, economy and Skycoach (colonial-cabotage) seats are offered in the ratio 14(F) : 66(E) : 18(S). First-class load factors have not so far been too high, although economy and Skycoach have attracted reasonable loads.

The operation has not, as yet, reached the profitable stage. There has been evidence of a demand for more than the 72 Skycoach seats offered per month; BOAC offer the same number, although on two fortnightly Britannia flights of 36 seats compared with CEA's four weekly Britannia flights of 18 seats. Skycoach, the cheap service for British residents between London and the Colonies, is operated in pool with BOAC, though first and economy are not. I formed the impression that CEA would like to put on

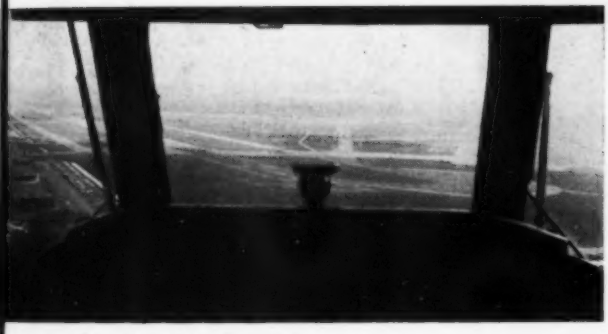
more Skycoach seats, but that BOAC are not too keen on this. Both partners must agree on any changes in pooled seats offered, though each can adjust the first/economy mixture on its own initiative.

Of the general prospects of the mid-Atlantic route, Mr Snelling talks of "a big potential." He believes that British holidaymakers have been sold on Palma and such places, and that they can now be sold, and are being sold, on Bermuda. At the moment traffic to London is largely business and residential. But the holiday potential is there. Up to July 1961, 1,520 people had come from the UK by air, and 92 by sea. The figures for the whole of the previous year were 1,322 and 130 respectively.

In developing this business the airline has the full support of the Bermuda Trade and Tourist Development Board, with whom it works closely. Tourism is this beautiful island's major industry, worth more than £10m in 1960. It is big business, run on business lines. A Blackpool landlady, if she talked holiday-trade shop with Mr Williams, the Bermudian who is responsible, would be as out of her depth as I was.

Statistics like an "achieved hotel-occupancy of 28.6 people per bed per year on the basis of an eight-day stay," which Mr Williams throws away one after another, mostly out of his head, are the language of an industry that has developed its own brand of economics. Any country which depends on tourism for its income could learn a lot from Mr Williams and his staff. There was no question I asked that was not answered off the cuff or by reference to massively documented files.

Why, I asked, did people go to Bermuda? The answer, compiled from multiple answers given in response to market surveys, was as follows: *Climate*, 57.2 per cent; *natural beauty*, 41 per cent; *beaches*, 34 per cent; *accessibility*, 22 per cent; *romantic atmosphere*, 16.9 per cent; *foreign country* [i.e., British territory], 12.6 per cent; *comparative cost*, 11.2 per cent; *sports* [skin-diving, surfing, water skiing, sailing, fishing, golf], 10.3 per cent; *other*, 1.9 per cent. This proportion of preferences has held good, Mr Williams said, since 1947.



. . . lines up on the main runway . . .

The fact that Bermuda is British is not the primary reason for its appeal to American holidaymakers. My impression was that, apart from the cars and the £ s d, the Britishness of Bermuda is rather phoney. The American influence and accent, particularly in the hotels where the fleeting visitor forms his impressions, are very strong. This is only natural in a country geographically so close to the USA, and so desirous of pleasing Americans.

There have been campaigns to "recapture the British image." In the airport terminal are hung the coats-of-arms of the English gentlemen associated with the early history of this oldest of all British Colonies (1609). In the trough season, from November to February, visiting Americans can see replicas of the Crown jewels in Hamilton, the capital; on Tuesdays they can have tea with the Mayor of Hamilton; on Wednesday they can hear the town crier in the old town of St. George. But it is a bit difficult to ask taxi-drivers and shopkeepers to help recapture the British image by quoting prices in £ s d when Americans ask: "Okay, but what is it in real money?"

Bermuda is a paradise of natural beauty, there is no doubt about that. There can be no more enchanting place in the world than Horseshoe Bay, no drives more delightful than those along Bermuda's narrow winding roads, past coral walls lushly banked with hibiscus, oleander, Morning Glory, royal palm—all spicing the air with a fragrance that perfumes the whole island.

But Bermuda is very American, and nowhere more so than in the hotels. Words cannot describe the luxury and flashiness of a place like the Carlton Beach Hotel. This is Bermuda's new $5m hotel, opened only a few weeks ago, each of its two great white curving wings enfolding a real genuine Bermuda coral beach cove. The beds are seven feet wide; the 1,200 sq yd carpets along the three floors of each curving wing were laid with hydraulic stretchers; and the 12-colour three-tier carpet in the lobby was woven in Puerto Rico at a cost of $80 a yard. The lighting and sound effects in the night club, which has movable "air walls" retained by pneumatic seals, out-marvels *Son et Lumière*, and the Henry End colour schemes in the lobby clash in spectroscopic defiance of conventional taste: orange v. heliotrope, crimson v. mauve. The mind boggles with admiration for the breathtaking vulgarity of it all.

The Britannia's economy-class interior is remarkably comfortable, though perhaps this snapshot—taken over the Atlantic on the morning after the night before—does not convey quite the same impression of luxury as do the professional airline publicity photographs

In Bermuda it is no use, if you are late, jumping into a car saying: "Airport, fast." The speed limit is 20 m.p.h., and your driver is fair belting along with 25 m.p.h. on the clock. If he is caught he is fined; at 30 m.p.h. he has his licence suspended as well. At 40 m.p.h. he is gaoled, and no argument. The 20 m.p.h. tempo is agreeably soothing and in accord with the general pace of life in this relaxing island.

The transition from Bermuda's narrow winding roads to the teeming expressway from Idlewild into New York City takes but 2¼hr by Cunard Eagle Viscount. In Bermuda only small European cars (99 per cent are British) are permitted; even the Governor General is only allowed an Austin Princess. Within 2¼hr I was on the road to New York City in a monster Cunard Eagle air-conditioned Cadillac, its two huge fins giving a passenger in the back the corner-of-the-eye feeling that another car is mounting the boot.

I was impressed by the speed with which the baggage was got out of the aeroplane at Idlewild. Not only was it all in the terminal before the passengers: my own was identified and brought to me within two minutes of my leaving the aircraft. Less than a week later, on a flight from Cork, I waited with 20 other passengers at London Heathrow Central for three-quarters of an hour for our baggage to be unloaded and delivered. I realized why the airlines at London want the Ministry to get out of the baggage-handling business. At New York Cunard Eagle do it themselves, with spectacular results.

. . . and taxies in to the international terminal (Capt Vivian Robinson)

After seeing the airline's New York establishment, described in the previous article (*Flight*, November 2), I flew down to Miami by Eastern Air Lines Golden Falcon Jet DC-8.

There is not much that can be said about Miami that has not been said already. But the fleeting impressions of an English visitor are worth recording, because this place—as a Cunard Eagle-propelled party of English travel agents recently learned—is now within reach

[*Concluded on page 860*

Straight and Level

MR MOAN (Lab): Will the Minister reconsider his decision to exempt toy balloons from the regulations against emitting or displaying any communication or advertising in such a way that they are audible or visible from the ground?

MR JOHN FUMBLING (Parliamentary Secretary to the Minister of Planes): No, Sir.

MR MOAN: Is the hon. gentleman aware that the desire to operate toy balloons—at a profit—is a pimple on the face of our affluent society? Does the Minister realise that here is a social evil of the same potential as Bingo?

MR FUMBLING: I will draw my Right hon Friend's attention to this point.

MR GROAN (Cons): What effect will the Wind of Change have on private toy balloons? Can the Minister make a statement?

MR FUMBLING: I would ask the House to be patient in this matter. It would be premature of me to anticipate the findings of the Royal Commission on Aerial Locomotion set up by Mr Gladstone in 1874.

MR MOAN: Is the hon. Gentleman aware that the last member of this Commission passed on in 1912?

MR FUMBLING: I would remind my hon. Friend of an old tag my Latin master was fond of repeating: *De mortuis nil nisi bonum.*

MR MOAN: I consider the hon. Gentleman's reply most unsatisfactory. I demand a probe into the operation of toy balloons by private enterprise, and in particular the accident rate of privately-owned balloons compared with those of the State corporations.

MR GROAN: Is the Minister aware that the noise of bursting balloons will, if allowed to go uncontrolled, make this city an unlivable hell?

MR FUMBLING: No, Sir.

● It has often seemed to me that television interviewers regard it as professionally smart to be as aggressive and bullying as possible. But never have I seen such bullying as that to which Sir Geoffrey de Havilland was subjected during a BBC *Tonight* programme last week.

It was supposed to be an interview about the memoirs he has just published, but these were scarcely mentioned. There wasn't anything about him as a person or about his fascinating life. In fact it wasn't really an interview—the interviewer seemed to do all the talking. He dismissed 50 years of work in a few seconds with still photographs of the 1910 aeroplane, the D.H.4, the Puss Moth and the Mosquito, and then devoted a long time to an elaborate cine-film of the Comet disasters, as if they had happened only last week. It seemed as though Sir Geoffrey alone had been responsible for the Comet disasters. The interviewer wound up by taking a poor view of the chances of British aircraft against those of America and France.

I agree that Sir Geoffrey need not have appeared on the programme and that he need not have answered the questions. He is such a shy person that, to my knowledge, he has never before agreed to a television interview. And he is too polite a person not to have answered the questions, which he need not have done. But there is no excuse for what amounted to a public display of cruelty.

This is Mr Paul Anderson, America's Olympic world champion weight lifter, and he has just done a "snatch" with a C-130 (lightly loaded, of course). Get the point? Well, he is a champion weight lifter, and so is the C-130! Get it? Seriously, Mr Anderson puts his muscles to uses other than Lockheed publicity: he has been doing a demonstration tour of the USA on behalf of a boys' club

● Some time ago we said "thank you" to London Approach radar for guidance given to *Flight's* Gemini through the London control zone. Now we offer a similar word of thanks to Farnborough, who when a colleague visited Odiham recently to see the RAF's new Belvedere Squadron, vectored the Gemini through their area in low cloud conditions and provided a similar service back to Fairoaks on the return journey.

Air traffic control in this country is often criticized for rules and regulations that restrict the movement of private aircraft. In our experience anything reasonable that we ask for is always granted courteously and promptly.

● NATO code-names for Russian aircraft lend themselves to all sorts of manipulation—and falsification. I offer the following suggestions for code-names to cover the probable developments of Beauty:

Night fighter version: Black Beauty; *reconnaissance version:* Beauregard; *ground attack version:* Beau Geste; *chemical warfare version:* Beauty Sleep; *Khrushchev's VIP version:* Beau Frere; *weather reconn. version:* Beau Temps.

News releases on my desk this week:—

● *From a Cessna release:—*

"Cessna's Anniversary Fleet was unveiled with sparkling showmanship. Over 1,200 Cessna salesmen, industry representatives, and component manufacturers marched through the streets of this mid-western city (Wichita) with a brisk pace set by a colorful 120-piece band.

"The serpentine parade wound its way to the civic Forum building and a huge mid-way, complete with barkers and a carnival atmosphere. On the mid-way were 16 sparkling new Cessnas and a replica of Clyde Cessna's first airplane . . . As visitors took an opportunity for a quick peek at the new airplanes, the mid-way suddenly fell dark and the crowd silent.

"Doors to a brightly lighted adjacent theatre were thrown open . . . The glamour of vaudeville days held forth as a full-scale minstrel show kept spectators wide-eyed for the next few hours with a combination of product presentation and razzle-dazzle."

(2) *From a Boeing news release (about the Spacearium at the forthcoming Seattle World's Fair):—*

"Opening with the lift-off of a space ship from Earth, the film takes the audience past the moon, the Sun, Mars, the asteroid Ceres, through the rings of Saturn and past the Sun's most distant planet, Pluto.

"In interstellar space, the cinematographic journey continues past a flare star, the huge red sun Antares, the glowing hydrogen spiral of Beta Lyra, a double star and the Lagoon Nebula to the center of our own Milky Way galaxy.

"At this point the film telescopes time and distance to leap into intergalactic space to give the audience views of the star cluster NGC 6539, and Andromeda and other galaxies containing a hundred billion stars."

I wonder when it'll be on at our local fleapit. Thinks: hope the hundred billion stars include Sophia Loren and Harry Secombe.

● *Affluent Society Note:* A *Flight* colleague on holiday in Palma recently was accosted near the cathedral by some children begging for money. Being softhearted, he distributed a few pesetas and walked on, only to be sternly upbraided in Spanish by a peasant woman on (he gathered) the undesirability of encouraging begging in the young. In her left hand was a cauliflower and in her right hand a TWA overnight bag.

● I have just heard about a really imaginative handicap race that took place at a Royal Australian Air Force display. The field comprised a Winjeel, a Dakota, a Vampire, a Canberra on one engine, a Canberra on two, a Sabre with 30 rockets and a Sabre clean. The Dak came in first.

ROGER BACON

Final checking of the Honeywell adaptive autopilot computer for the X-15. The equipment contains 8,771 parts and weighs 92lb

FLIGHT SYSTEM SURVEY

ADAPTIVE AUTOPILOT FOR X-15

FOLLOWING successful testing of the Minneapolis Honeywell adaptive autopilot in an F-94C in 1958 and then in an F-101, the company is soon to fit such a unit to the X-15, for only with this equipment will the aircraft be able to achieve the maximum altitude of which it is capable.

Designed for an astonishing mean time to failure of 200,000hr, this computer system includes 8,771 parts in 90 circuit cards and weighs 92lb. "Dual redundant," it provides four channels for aerodynamic control and four for reaction control, the transition being controlled automatically according to air density. In fact, the autopilot senses the responses to its own control applications and adjusts them to produce a given attitude response. Main information sources are the Sperry inertial platform and the Northrop "Q-ball" dynamic sensor in the nose of the X-15. Some 1,300 hours' ground testing and 300 hours' flying have been completed and many NASA, US Navy and Air Force pilots have flown the development versions. The adaptive system is also to be applied to the Boeing Dyna-Soar boost-glide vehicle.

To describe the adaptive autopilot in more detail we may begin with the pitch damper, which consists basically of a pitch-rate-feedback inner loop. Pilot commands are introduced through the control model as electrical signals proportional to stick force. The use of series servos with feedback networks results in semi-integrating servo control, allowing full servo authority to be commanded with only a small error signal. Because servo authority in pitch is only about half of the full surface authority from any trim position, automatic trim is used in all modes of operation to augment the servo authority. The sum of the servo and trim authorities is equal to the full surface authority; and the control system is therefore able to command full surface-displacements. The right-hand stick trim-wheel and the centre stick trim button command pitch rate. Rotating the right-hand stick trim will command a pitch rate proportional to the amount of rotation. The centre stick button commands a constant pitch-rate.

Three autopilot modes are provided in the pitch axis; control stick steering (CSS), attitude hold, and angle-of-attack hold. With the CSS mode selected, normal acceleration and pitch rate are fed back as primary inner-loop signals. The ratio of acceleration to pitch rate is adjusted to provide adequate damping and an essentially uniform acceleration response throughout the flight envelope. A normal acceleration command system is particularly advantageous during re-entry, when a predetermined g manœuvre is to be performed. The angle of attack and attitude hold mode utilize the pitch-rate inner loop, the attitude reference signal being obtained from the stable platform and the angle of attack reference from the flow direction sensor or Q-ball. Gross changes in hold mode reference can be made by depressing a button on either the centre or the right-hand stick and commanding the aircraft to the new attitude or angle of attack. When the button is released the hold mode will re-engage at the new reference.

If normal acceleration exceeds approximately 6g absolute, a strong feedback signal is introduced, so that a command for more than 6g requires considerably higher stick-force. In addition, with either pitch-attitude hold or angle-of-attack hold engaged and the 6g limit exceeded, the reference angle will be reduced.

In the roll axis, the damper consists of a roll rate feedback inner loop. Pilot commands are introduced through the control model as electrical signals proportional to stick-force. The roll autopilot provides roll-attitude hold in all parts of the flight regime and heading hold in the aerodynamic region. The CSS button on either stick will cut out the reference hold and allow the aircraft to be manœuvred. In the ballistic region of flight, only roll-attitude retention is provided. As little or no aerodynamic force is present, heading cannot be changed by banking, and it therefore must be controlled through the yaw channel. The transfer of heading control from roll to yaw occurs automatically whenever the reaction controls are energized.

A yaw damper utilizes a combination of high-passed yaw rate and lateral acceleration feedbacks in the adaptive loop for the aerodynamic region of flight. Force switches in the rudder pedal linkages disengage the heading reference when the rudder pedals are used to allow changes in heading to be made with the reaction controls.

Dual fixed-gain channels parallel the dual adaptive channels in each axis. These provide an emergency system so that control is maintained if the adaptive channels fail. The fixed gains are set at approximately the lowest critical gains in the flight envelope. For increased reliability, the fixed gain channels are operative at all times, eliminating switching if a failure occurs. Control in both the aerodynamic and reaction control regions is provided by the fixed-gain system.

Automatic transition from aerodynamic to reaction controls is provided, allowing the pilot to manœuvre the aircraft throughout the entire flight envelope with a single stick and rudder pedals. As the height increases, the system-gains increase to compensate for the reduction of effectiveness of the control surfaces. When the gains reach about 80 per cent of their maximum values, at about 130,000ft, the reaction controls are energized. By reason of a pre-set deadspot, the reaction controls will not necessarily be used even though energized; instead, the aerodynamic surfaces will continue to provide a large part of the control with the reaction controls operating only when the system errors exceed the deadspot values.

During re-entry, as dynamic pressure increases, the limit cycle will be resumed at about 130,000ft and the reaction controls will be de-energized when the gain decreases to 60 per cent of maximum. The system thus uses a minimum of reaction control fuel, maximum use being made of the aerodynamic controls.

Fail-safe System

Each axis of the system is mechanized in a parallel redundant manner in order to provide fail-safety. The redundant mechanization includes several comparators and limiters which allow the system to remain operative on the adaptive loop for 90-95 per cent of all failures. Failures in one axis will not disengage any other axis. Furthermore, a "hard-over" in the outer-loops will cause the system to revert to the damper mode and a hard-over in the adaptive loop will at worst cause that axis to revert only to the back-up, fixed-gain circuitry.

The rate dampers in each axis are dual-channel, incorporating dual rate gyros and servo pick-offs in addition to dual electronic channels. The stick and rudder pedal position transmitters are also dual. Dual fixed-gain channels parallel to the adaptive channels provide adequate damping to maintain control of the aircraft if the adaptive channels are switched out. Dual accelerometers are provided in both yaw and pitch axes. The autopilot inputs themselves (roll and pitch attitude, angle of attack, and heading) are not dual, but are summed into both channels of their respective axes.

The redundant configuration ensures continued operation in the event of most types of failure. The majority of open or null output types of failure will result in only a 50 per cent reduction in the maximum obtainable gain of that axis. Disengagement monitors will cause any hard-over signals from gyros, accelerometers, or stick and rudder pick-offs to be switched out, following which the system operation will be similar to that resulting from an open-type failure. A hard-over in certain portions of an adaptive channel will cause both adaptive channels of that axis to be switched

SYSTEM SURVEY . . .

out. The fixed-gain channels will remain, providing adequate damping for control of the aircraft.

Failure of one gain-change computer will have no effect on the system since the gain-change computers in the dual redundant system are slaved to each other so that the gain in both channels will be controlled by the good gain-changer.

The servo actuators are not dual redundant and thus must operate if at all possible. Servo monitors are provided which will disengage and centre the servo if the servo actuator fails to the extent of impairing instead of aiding the pilot's control of the vehicle, but will not disengage the servo actuator if it is at all useful.

In Brief

Following their £¼m order from the RAAF, Sperry have now received two orders together worth £¼m from the German Defence Ministry for instruments and spares. The British Sperry order-book is now larger than it has been for many years.

BEA has acquired five Cossor Type 109 VHF radio stations for remote operation via GPO land-lines at London (Heathrow). Each station will operate on a separate channel and will communicate with BEA vehicles on the airport.

In recent flight tests, Ryanav IV, the "second generation" Doppler radar produced by Ryan Electronics, is reported to have shown accuracies of 0.25 per cent in ground velocity and 0.75 per cent in distance gone. Operating in the kilo-megacycle band, it is claimed to be lighter and smaller than its predecessors, more simple to install and more versatile. Ryan report that the equipment is being prepared for production for the US services and for NATO countries.

Communications (Air) Ltd announce the type FT 13 C VOR/ILS signal simulator, with which a one-degree change in VOR bearing can be manually simulated. The earlier FT 13 B can automatically check an aircraft installation in ten minutes; and this set can now be modified to incorporate the manual one-degree bearing test as well as the existing 60° change.

Agreement has been reached between Smiths Aviation Division and Kollsman Instrument Corp by which Smiths will fulfil orders for Kollsman equipment they hold at present, all new orders being taken by the recently formed Kollsman Instrument Ltd. The companies are to work "in a spirit of friendly competition."

The new Amplivox ear defenders can now be mounted in a special fabric helmet which provides maximum stability in rough weather or in confined spaces. The protectors themselves have liquid seals which, it is claimed, reduce high-frequency noise to one ten-thousandth of its original intensity.

Under a recent agreement, Armstrong Whitworth Equipment are to place their sales and publicity organization at the disposal of Penny & Giles. The latter company successfully produced a rectilinear potentiometer for control-position feed-back in the autostabilizer system of the Javelin when other types had proved unsuccessful. Penny & Giles make precision stabilizers, pressure transducers and an aircraft crash recorder.

To be installed in Australia, a VLF transmitter for the US Navy is being designed by Continental Electronics Manufacturing, a subsidiary of Ling-Temco-Vought. To be known as VLF Pacific, the new station will probably be of about two megawatt power and will be able to communicate with ships and submerged Polaris submarines anywhere in the Pacific. A similar station, built by Continental under a $50m contract, is already operating at Cutler, Maine.

CORRESPONDENCE

The Editor of "Flight" is not necessarily in agreement with the views expressed by correspondents in these columns. The names and addresses of the writers, not for publication in detail, must in all cases accompany letters.

First Man-powered Flight

AT the beginning of the article "Big Day for the Birdmen" in *Flight* for November 16 you say: ". . . the credit for being the first to get off the ground unaided in a man-powered aircraft must go to the group of Southampton University graduates . . ."

I do not dispute that the Southampton team deserve a great deal of credit for their work in the man-powered flight field, but I doubt whether they can take credit for the *first* man-powered aircraft to leave the ground unaided. A paper in the *Canadian Aeronautical Journal*, December 1960, entitled "A Man has flown by his own power in 1937" is my main ammunition. In this, Enea Bossi describes his attempts at man-powered flight in some detail, and the following sentence appears: "On the first day, after a few attempts, the plane actually took off by its own power, and flew 300 feet before landing. (figure 7)" Figure 7 is a photograph of the machine in flight.

I would be interested to learn from aviation historians whether Enea Bossi's flight is generally recognized as the first man-powered flight.

London W7 ALAN E. SMITH

[The pilot in the flights of the Bossi-Bonomi aircraft, as described in the *Canadian Aeronautical Journal*, was a Mr Casco. Mr B. S. Shenstone, an authority on man-powered flight for many years, states that Bossi's claim for a man-powered take-off and flight by Casco in 1937 seems to be well founded, and that it apparently does represent the first occasion on which the feat was accomplished. As the beginning of the sentence partially quoted by Mr Smith was intended to indicate ("Whoever wins the Kremer Prize for the first man-powered flight around a specified figure-of-eight course, . . ."), the context of the Southampton "first" reference was the Kremer Competition.—Ed.]

WITH the heightening interest in man-powered flight I wonder if your readers would care to see the enclosed two photographs [reproduced below—Ed] given to me in 1943, when my squadron was operating from a small airfield near Sherborne, Dorset. They are of the Rev Alfred J. Bartlett, who was then the Rector of Marston Magna, near Yeovil, and were taken in 1893 when as a young man of 27 he was experimenting with propeller design suitable for man-powered flight.

When I met him, he must have been at least 77 years of age and was most knowledgeable in flying matters. With a twinkle in his eye he claimed to have held the world's speed record at 40 m.p.h. in 1893 with the pedal-driven machine illustrated. If my memory serves me right, he explained that it was suspended from two wires slung from a third wire attached to the tops of two high elm trees.

In conclusion, may I quote the following entry from the 1928 Edition of *Who's Who in Aviation:*—

"BARTLETT, Reverend Alfred James
b. Watton-at-Stone, Herts, Aug 15, 1866; s. of the late Rev J. B. B. (Rector of Rowberrow, Som). Club: Westminster. Made monoplane glider model embodying the dipping entering edge, 1887; attempted design of light rotary steam engine for direct lift machine, 1892; testing experimentally powers of various sizes and types of foot-propellers for gliders. Add, The Rectory, Marston Magna, Nr Yeovil, Som. T. Marston Magna 26."

London SW15 C. R. HODGSON

[The 40 m.p.h. claimed by the Rev Bartlett may indeed have been a world's speed record; according to *The Autocar Diary* the record for cars as late as 1898 stood at 39.24 m.p.h. His "dipping entering edge" may have resembled those to be fitted to the D.H. Trident.—Ed.]

The Rev Bartlett in action (see letter from Mr C. R. Hodgson). Suspension wires, here invisible, would explain the startling height and attitude

Did Channel Air Bridge Make Money?*

YES.

D. A. WHYBROW,
Director, Channel Air Bridge Ltd

London W1

V_1 or Distance Indicator?

THE Air Ministry [MoA—Ed.], and the FAA in America, have investigated the effects on performance of slush and standing water on runways (it is gratifying to know that the Department of Scientific and Industrial Research were invited to participate in the FAA experiments at Atlantic City). The same conditions can produce acceleration, retardation and braking aquaplaning. Their findings may revise present landing and abandoned take-off figures.

However, whatever calculations are completed before take-off, an emergency allows no time for hesitation. During take-off and landing, a fully engaged captain is best served if some of his instruments provide simple YES/NO information.

It is therefore suggested that V_1 or decision speed be replaced by a distance indicator actuated by an undercarriage wheel. A preset calculated stopping distance would give YES/NO information on whether or not the take-off could be abandoned, and the aircraft brought to a stop without damage or injury. On occasion a stop would be possible up to the point where the aircraft should have reached Vr. As an example:—

Sea level, dry runway, calm, 5°C, max weight, a Comet 4 requires 6,000ft of runway. Rome Fiumicino, altitude 7ft, calm, nil gradient:

R/W	Temp (°C)	R/W Length (ft)	V_1 (kt)
07	41	6,807	113
16	45	12,800	114
34	45	12,800	114

It will be observed that, using V_1/Vr ratio to determine the power failure decision point gives almost the same speed—113—114—114—and therefore the same distance down the runway. Beyond this speed the aircraft will continue the take-off. A captain with the misfortune to lose an engine is much too occupied to guess how much runway remains, yet both 16 and 34 have thousands of feet of solid, safe, comfortable stopping distance beyond the point where the aircraft could be flying on three engines.

Landing distance is, of course, determined by calculation. Allowances are made for water, slush, snow and ice on the runway. It would be more realistic if the power-failure abandoned take-off case were considered as a special landing problem, and the emergency stopping distance calculated and, with a distance indicator, use made of the built-in safety of excess runway.

H. T. THOMPSON

Woking, Surrey

R/T Phraseology Amendments?

"THAT is affirmative, Sir"—*There's a Yank on the line.*

"I say again—say again"—*There's a private pilot loose in the zone.*

"Requesting Queenie Dog Mike"—*I have 15,000hr on 56 types.*

"Roger Dodger"—*I am a very slick pilot.*

"Er-Roger"—*I haven't understood a word, but my captain is nodding his head vigorously.*

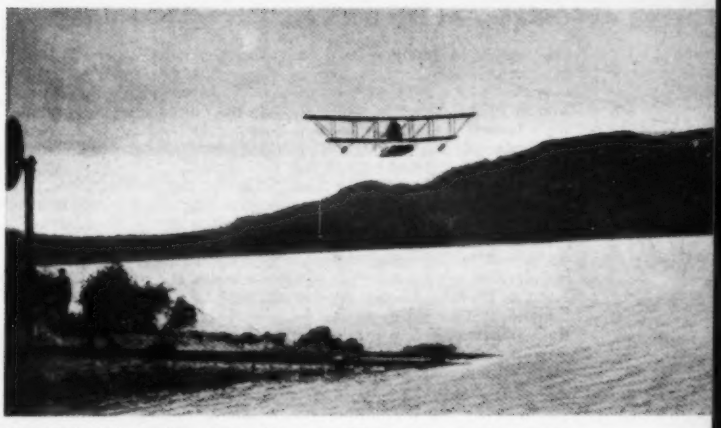
CO-PILOT

Glasgow S1

Britain's First Seaplane

FIFTY years ago, on November 25, 1911, Britain's first successful hydroplane made its initial flight over Lake Windermere, and I write to draw attention to the fiftieth anniversary of this event.

E. W. Wakefield, of Kendal, first concerned himself with the problem of taking off from, and alighting on water, late in 1909 and constructed many experimental floats. These floats, of different sizes and shapes, were loaded with sandbags to represent the weight of machine and pilot and towed at speed across Lake Windermere. The results of these experiments were tabulated, but it was not until Mr Wakefield had visited M Fabre in France and gained valuable advice that he designed a successful float. This was made of mahogany by Messrs Borwick of Bowness-on-Windermere and was strengthened with metal strips.



The Wakefield seaplane being flown at Windermere—a photograph from "Flight" for June 22, 1912. Our issues at that time gave the name of the aircraft as "Waterhen" and not "Water Bird" as given by Mr H. F. Cowley in the letter "Britain's First Seaplane" below

In the meantime Mr Wakefield requested A. V. Roe & Co to build a Curtiss-type machine. It was a two-seater pusher bi-plane with wings of unequal span, only the upper wing having ailerons. Four ailerons were fitted to this wing, the inner and larger pair having semi-circular trailing-edges. Bamboo outriggers bore the tail unit and also the forward elevator, which was operated, in conjunction with the tail elevator, by a bamboo pole in a similar way to that used by S. F. Cody on his biplanes. The unbalanced rudder displayed the name and address of the manufacturers. A 50 h.p. Gnome engine drove an 8ft 6in Avro propeller.

In June 1911 the machine was taken to Brooklands, where it was tested as a landplane—Ronald Kemp, F. P. Raynham and Louis Noel being among those who flew it. On the successful completion of the tests the aeroplane was taken to Hill of Oaks, Windermere. Here Mr Wakefield, as director, had formed the Lakes Flying Co, with the Earl of Lonsdale as patron and Stanley Adams as manager and pilot. Mr Adams had gained RAeC Aviator's Certificate No 97 on June 27, 1911, on an Avro biplane at Brooklands and was to do valuable work for the Lakes Flying Co.

On arrival at Lake Windermere the machine was fitted with a single central float and named *Water Bird*. Cylindrical airbags with spring-board protectors steadied the biplane on the water (they rejoiced in the local nickname of "Wakefield Sausages").

Modifications and preparations completed, Stanley Adams, wide open to the elements, taxied out from Hill of Oaks on November 25 and gave *Water Bird* her first flight from water. Her fame spread quickly and in the months that followed many enthusiasts travelled to Lake Windermere for passenger flights. During December 1911 and January 1912 *Water Bird* made 60 flights on 38 different days, the longest of which was one of 20 miles, when a height of 800ft was reached. Lt Arthur Longmore (later Air Chief Marshal Sir Arthur Longmore, GCB, DSO) made his first flight from water on

* See "British United's Report: a Postscript," *Flight*, November 9, page 748.

FORTHCOMING EVENTS

Dec 1 RAeS Rotorcraft Section: All-day Meeting.
Dec 2 British Interplanetary Society: "International Law Extra-terrestrially Applied," by Bin Cheng.
Dec 6 BritIRE (West Midland Section): Conference on "New Electronic Techniques in Non-destructive Testing."
Dec 12 RAeS Astronautics and Guided Flight Section: "Military Requirements of Guided Missiles," by Brig. E. W. Denison.
Dec 13 RAeS (Main lecture at Manchester Branch): "Airlines' Approach to Aircraft Selection," by M. Nivet.
Dec 13 RAeS Agricultural Aviation Group: Symposium on "The Uses of the Aeroplane in Agriculture."
Dec 13 Royal United Service Institution: "Some Reflections on the Strategic Air Offensive, 1939-45," by Dr Noble Frankland.
Dec 14 British Interplanetary Society: Symposium on "Auxiliary Power Generation."
Dec 15 RAeS Man-powered Aircraft Group: "Problems of a Man-powered Rotorcraft," by R. A. Graves.
Dec 17 Institute of the Aeronautical Sciences: Wright Brothers Lecture, Washington DC.
Dec 18 Institute of Transport: Annual General Meeting.
Dec 19 Photogrammetric Society: "Adjustment of Aerial Triangulation by Electronic Digital Computers," by D. W. Proctor and Fuad Amer.
Dec 19 Institute of Transport (West Middlesex Group): "Practical Aspects of Operating Jet Aircraft," by Capt J. B. Linton.
Dec 21 Society of Instrument Technology (Grangemouth Section): "Instrumentation of Space Vehicles," by Dr A. E. Roy.
Jan 1 Institute of Transport (Metropolitan Section): "Development of an Airport," by Maurice G. Housego.
Jan 4 RAeS: Young People's Lecture, "Airliners of the Future," by Godfrey H. Lee.
Jan 5 RAeS Rotorcraft Section: "Rotating Aerofoils and Flaps," by Dr S. Neumark.
Jan 10 Guild of Air Pilots and Air Navigators: Livery Dinner.
Jan 15 RAeS Historical Group: "R.101 and Other Airships," by Sir Harold Roxbee Cox.
Jan 16 RAeS Astronautics and Guided Flight Section: "Development of Seaslug," by C. Bayly and A. Lightbody.

RAeS Branch Fixtures (to Dec 7): Dec 1, *Reading and District*, Annual Dinner-dance. Dec 4, *Derby*, a.g.m. and "Design and Development of the Rolls-Royce Conway," by L. G. Dawson. Dec. 5, *Bristol*, "Aircraft Flight Safety and Missile Reliability," by AVM H. B. Wrigley. Dec 6, *Brough*, "Vertical Take-off by Jet Lift," by D. Keith-Lucas; *London Airport*, "Aviation Fuels," by W. S. Little. Dec 7, *Glasgow* (Graduates' and Students' Section), Film Evening.

CORRESPONDENCE . . .

the aircraft in January 1912 and described it as a very thrilling experience.

Water Bird's days were numbered, however, for at the end of March 1912 the shed in which she and the Gnosspelius monoplane were housed was blown down during a gale; and while the latter received superficial damage, *Water Bird*—our first successful hydroplane—was completely destroyed.

During recent months the float, tailplane and rudder from this historic machine have been located, the latter still proudly displaying the makers' trade mark—"A. V. Roe & Co, Manchester."

Despite of, or because of, your columnist Roger Bacon it may be as well to state that in June 1911 Oscar Theodor Gnosspelius managed to get his monoplane off the water at Lake Windermere and Cdr Oliver Schwann did likewise with his Green-engined Avro biplane at Cavendish Dock in mid-November 1911. But both these efforts ended in immediate crashes and in no way could the attempts at flight be called successful. Both machines were later modified and in 1912 gave good accounts of themselves.

Hounslow, Middx H. F. COWLEY

Parachutists' Exemptions

[This "open letter" has been addressed by Mr Reilly "to all kindred spirits in the flying world"—Ed.]

THE rapidly expanding sport of parachuting demonstrates a splendid blend of teamwork and mutual confidence between parachutist and pilot. This teamwork will, however, be enhanced if the pilot has the same knowledge of the legal requirements involved as has the parachutist.

Each sporting parachutist is required by law to carry a document (issued by the MoA) known as either a general or restricted exemption. These documents exempt both the pilot and parachutist from that section of the Air Navigation order of 1960 which states that no object or person shall be dispatched from an aircraft in flight over the United Kingdom. They also outline the conditions under which parachuting may take place.

In the best interests of sporting aviation, all pilots are advised to check that any parachutist they propose to drop is in possession of a current exemption. It is of no help to anyone if this informative document is kept tidily locked up in the club secretary's office, and never read. If the parachutist's annual exemption has expired, or if he produces any other certificate—such as an international certificate "A," "B," "C," "D," "E," "F" or "G"—without an exemption to validate it, the pilot should decline to fly him.

The co-operation of all parachutists and pilots is invited in this simple matter. There is no hardship for a parachutist in carrying his exemption with him, and it is surely in the interests of all concerned that a pilot should be able to familiarize himself with those sections of the rules which affect him.

London WC1 MIKE REILLY

Rearward-facing Seats

IN his letter (November 16) about passenger seat strength requirements, Mr R. E. Hardingham states: "Generally, under crash-loading conditions a backward-facing seat imposes greater stresses in the floor structure than does a forward-facing seat." With due respect I suggest that the reason for this is that the backward-facing seat supports the sitter instead of letting him break.

The present Sir Charles Darwin has indicated that important evolutionary changes in the human species cannot be expected in much less than a million years. I hope the ARB is not prepared to wait so long for its both-ways 9g requirement to be met by the human body.

Surbiton, Surrey R. C. ABEL

THE INDUSTRY

Clean, Cleaner, Cleanest

AT the Ansty (Coventry) factory of the Power Division of Bristol Siddeley Engines Ltd a "clean area" has been established, by reason of the extremely fine tolerances to which the company's gas-bearing circulators are built and in accordance with requirements specifying assembly in clean conditions for equipment to be used in radioactive circuits.

The facility consists of a semi-clean area of 1,200 sq ft, fully clean area of similar size and two final assembly cells each of 200 sq ft area. Its seven rooms were made by John Bass Ltd, 36 The Broadway, Crawley, Sussex. Total area is 33,000 cu ft, of which 19,400 cu ft is given to an ultra-clean area. This latter section is fully air conditioned and incorporates temperature control (68°F), humidity control (30 per cent relative humidity) and filtration down to 1 micron. In the semi-clean room the air is filtered down to 5 microns.

This installation, tailor-made for Bristol Siddeley, incorporates various ingenious methods of rendering rooms dust-free. The timber and hardboard structure is spread inside with p.v.c., the resultant cocoon providing an effective seal against the ingress of dirt and moisture. Lighting is provided by fluorescent fittings above ¼in wired-glass panels in the ceiling. The floor is protected by p.v.c. sheeting with the joints butt-welded into a single impermeable area which itself is sealed to the walls by p.v.c. coving. Special clothing recommended by John Bass Ltd for use by operatives in the ultra-clean area comprises nylon boiler-suit, boots, headgear and gloves.

Not a hospital operating theatre, but the main assembly ultra-clean room at the Ansty works of Bristol Siddeley's Power Division. Much of the equipment is by John Bass Ltd, and conditioned air is filtered to 1 micron (see news-item above)

This new Thorex soft hammer has a patented steel head fitted with replaceable screw-in faces of a specially tough nylon. The makers—Thor Hammer Co, Highlands Road, Shirley, Birmingham—state that it is already the subject of repeat orders by a number of leading aero-engine manufacturers

IN BRIEF

Air Engine Services (U.S.-U.K.) Ltd have changed their name to Air Engine Services Ltd. Their address—Blindley Heath, Lingfield, Surrey (tel. Lingfield 2646)—remains unchanged.

General secretary for the Technical Publications Association is now Mr A. D. Oakes, 90 Cherry Way, Hatfield, Herts (Hatfield 4759). He succeeds Mr J. Lucas, who had to resign because of illness.

Mr A. W. Wilson has been appointed market development manager of Deeglas Fibres Ltd, a subsidiary of BTR Industries Ltd. Prior to joining Deeglas Fibres he was chief plastics engineer of Bristol Aerojet Ltd.

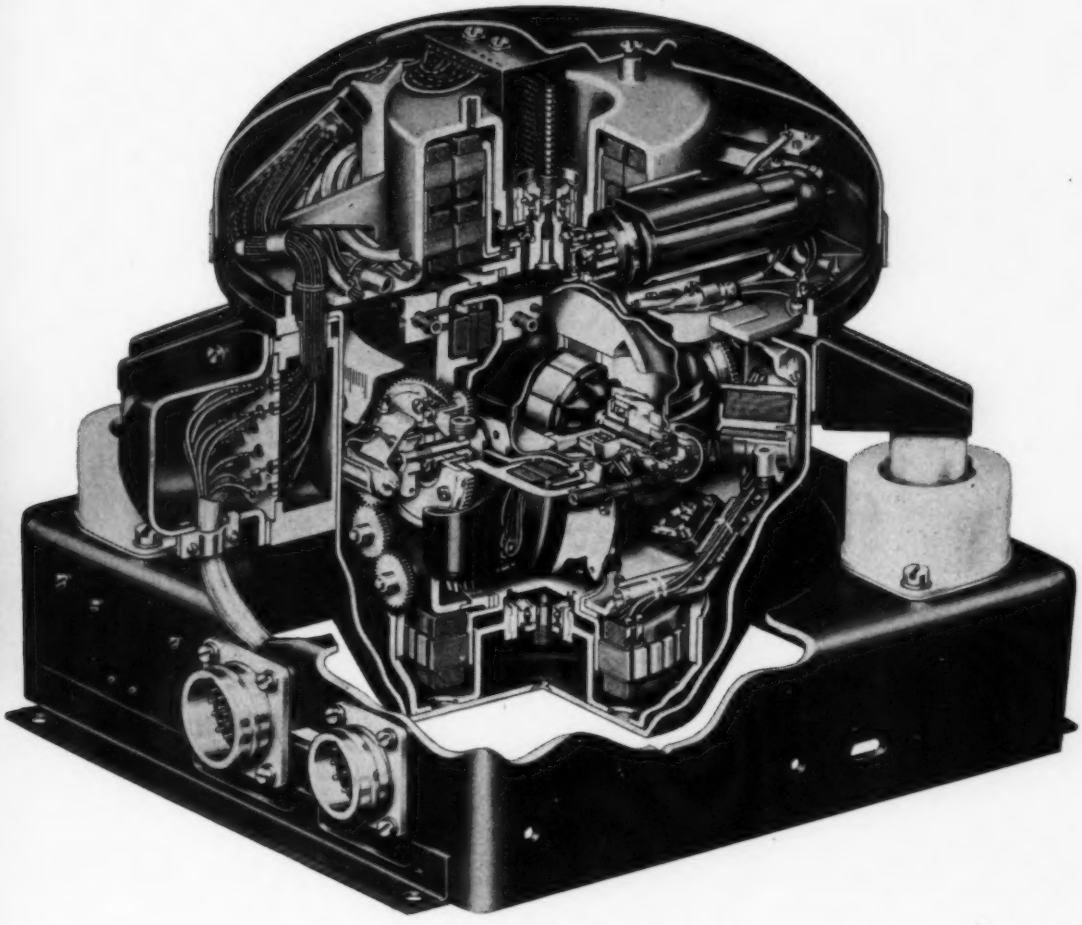
Plessey International Ltd have announced the appointment of Mr G. H. Doust as a director of the company. He joined Plessey in 1958 as deputy to the general manager, and was himself made general manager in June 1960.

Mr A. M. Dobson, BA, AFRAES, has been appointed education officer of Vickers-Armstrongs (Aircraft) Ltd and will be responsible for the company's training programmes. A wartime RAF Bomber Command pilot, he taught for six years after the war, then joined Vickers-Armstrongs (Aircraft) in 1953 as a mathematician in a small section from which has developed the dynamics and mathematical services department.

Ferranti Ltd have announced that Mr Maurice C. Curties, BSC, AFRAES, has been appointed senior project engineer (VTOL systems)—a newly created position—in the aircraft equipment department, at Bracknell, Berks. He will be responsible for the department's activities in instrument systems for helicopters and other VTOL types of aircraft (Ferranti's work in this field was described in *Flight* for February 24 this year). Mr Curties was formerly with BEA as senior development engineer (instruments), and while with the corporation was a member of the flight technical sub-committee of IATA.

Less than 1° per hour...

... the new Sperry "Rotorace"* gyros have a free drift rate of less than 1° per hour which provides the extremely accurate directional reference required for the new high performance aircraft for both military and civil operation. They are now in quantity production in the United States, Canada and England to meet a rapidly increasing demand.



The new C.L.11 "Gyrosyn"* compass incorporates a "Rotorace" gyro to provide a highly accurate gyro-magnetic compass which can also be used in the unslaved mode as a free directional gyro reference. Monitoring of all ancillary equipment can be provided in either mode as required.

SPERRY "ROTORACE" GYROS

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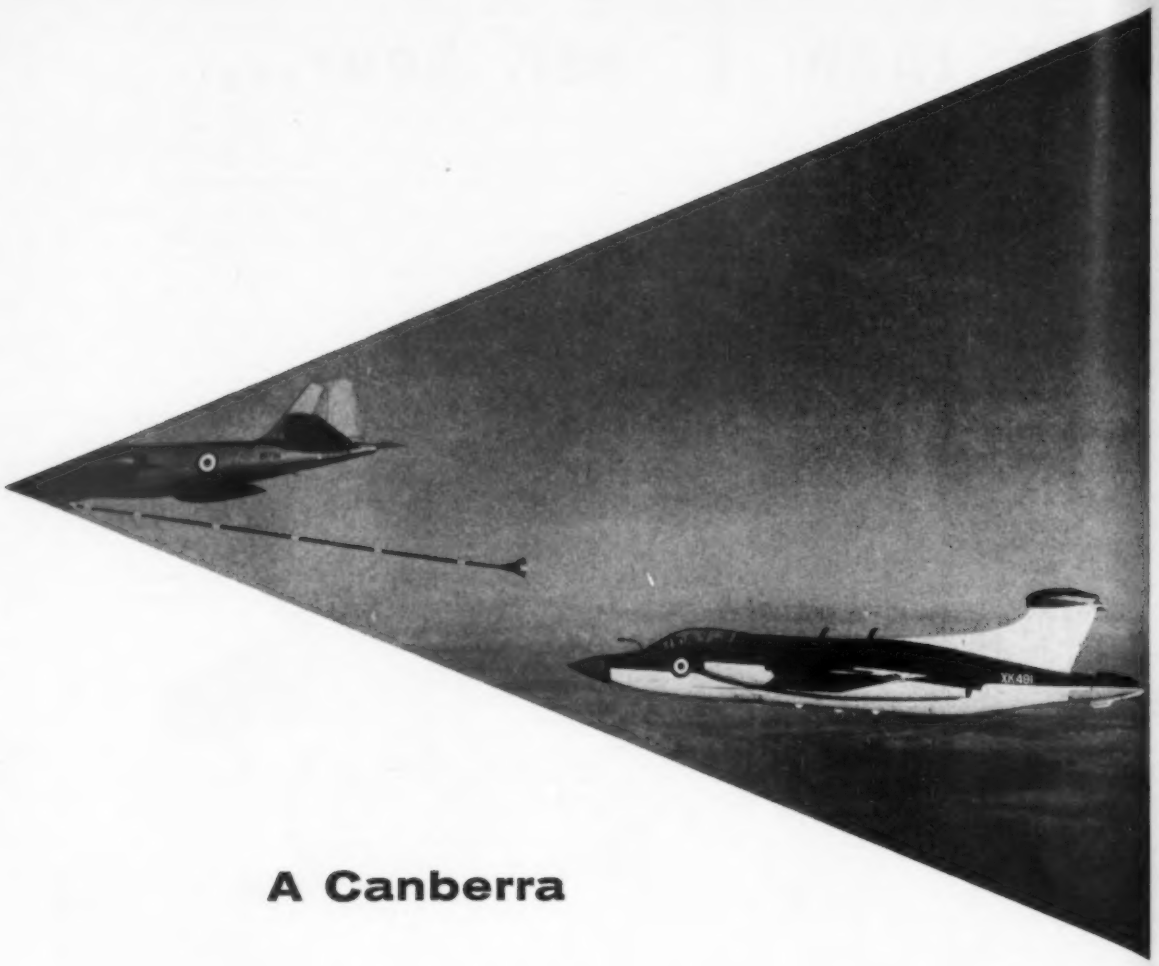


A Canberra

refuels the next generation . . .

the Blackburn Buccaneer

Designed both for low-level strike and high-altitude sortie, the Buccaneer is the ideal general-purpose aircraft of the next generation.

It successfully combines optimum performance with realistic cost.

Role equipment—bombs, rockets, photo-reconnaissance cameras, etc.—can be interchanged quickly.

HAWKER SIDDELEY AVIATION

A. 181

32 Duke Street, St. James's, London S.W.1

Britain's biggest and most advanced commercial hovercraft, the Westland SRN.2, is now undergoing initial engine runs. Four 815 h.p. Blackburn Nimbus free turbines provide the power, and the SRN.2 can cruise at 80 m.p.h. with 66 passengers for up to 200 miles

AIR COMMERCE

A Blow for the Board

ON November 21 the Minister of Aviation published the report by Sir Fred Pritchard, the commissioner who last September heard BOAC's appeal against Cunard Eagle's North Atlantic licence. The report, dated October 10, recommended that BOAC's appeal be upheld. The Minister accepts this recommendation, and he does not dissent from any point in the report. This article reviews the implications.

STUNNING may well be the right word to describe last week's blow to the independents in general and to Cunard Eagle in particular. It may also be the right word to describe the blow to the authority of the Air Transport Licensing Board, and to the confidence that Britain's airlines—corporations and independents alike—can henceforth place in the authority of the Board.

Decisions of this Board must, if the licensing system is to make any sense at all, have a sanctity which cannot be violated in any but the most exceptional circumstances. It should indeed be the duty of the Minister, having set up the Board to regulate British air transport, to confirm and strengthen the authority of his creation. By allowing an appeal against the first major decision of the Board to be upheld he has inevitably weakened the Board's authority.

He need not regard as anything like so weighty the recommendation of his appeals commissioner, whose uneasy place in the licensing machinery was created by the Minister, as an afterthought, vicariously to make decent his supreme power over the disposal of appeals. In fact his powers in this respect are complete, and he should use them—except for the most compelling reasons—to uphold the authority of the Board. These principles hold good whether a corporation or an independent appeal is at stake.

Are there, in this case, such compelling reasons for a Board decision to be thrown out? The "central feature" of the BOAC appeal, according to Sir Fred Pritchard's report, is that the Board agreed that BOAC has bought sufficient aircraft to cater for all the traffic that might reasonably be expected over the next five or six years. Sir Fred says that this is inconsistent with the Board's finding that a Cunard Eagle service would cause no "wasteful duplication."

This is the main ground on which Sir Fred Pritchard recommends, and the Minister accepts, that the BOAC appeal be allowed. Does this mean that an objector's future traffic is automatically protected by its orders for new aircraft? On a strict legal interpretation of words in the Act and in the Board's decision, it does suggest that there is no point in any further independent applications during the next five years or so, because the corporations will always be able to show that they have ordered sufficient capacity adequately to cater for future traffic.

Oddly enough, the "adequate capacity" argument was not the cornerstone of the BOAC appeal; and even more curious is the omission by Sir Fred of any reference to the fact (which came out at the appeal) that BOAC ordered three more Boeing 707s during the hearing before the Board.

Legal Semantics

The fate of an Air Transport Licensing Board decision should not rest on legal semantics. As was said in a *Flight* leading article on September 7: "*The commissioner must see whether the Board has interpreted the law correctly. He must also see whether the laws of natural justice have been observed, and in doing so he must bear in mind that the ATLB is not a court of law, but an administrative tribunal, with a very wide discretion.*"

The Act requires the Board to consider a number of things "in particular" before granting a licence. Some of these things, like "wasteful duplication" and "material diversion," are so abstract that the Board has to weigh them, with other things, with the discretion that *as an expert body* it must be allowed to exercise. It is not a court of law, and it will not do for a judge—even one as eminent and learned as Sir Fred—to take words out of the Act and appear to suggest that they have precise meanings.

One part of Sir Fred's report is a slap in the face for the Board. He says that the Board in its decision "made no reference to the furtherance of the development of British aviation" and that in his opinion the Board, in granting the licence, did not exercise its functions in such a manner as it is required to do by the Act "to further the development of British civil aviation." Can it be that Sir Fred did not read the Board's decision? A reference to its duty in this respect is clearly made in paragraph 11 of the Board's decision. This is a surprising slip by someone with a professional care for words, and it tends to diminish one's confidence in the whole report.

It must be galling for the Board to be criticized by one man, who has not their experience of air transport and who does not concede that the Board has discretion, that it has failed in its fundamental duty. Evidently the Minister senses the possibly demoralizing effect of Sir Fred's swingeing—and inaccurate—statement, because in his letter upholding the appeal (a letter which is longer than the appeal report itself) he goes out of his way to comfort the Board.

The Minister, the letter says, is "*satisfied that . . . the Board were fully seised . . . of their primary duty . . . to exercise their functions in such a manner as to further the development of British civil aviation.*" Even more significant is the letter's reassurance that the Board, in the Minister's view, formed opinions on the matter "which their experience and expert knowledge fitted them to do."

Having said that, the Minister cites two such Board opinions, and then disagrees with the Board on them.

First, he cites the Board's opinion on the controversial matter of "material diversion." The Board said, it will be remembered, that to refuse a licence on the grounds of material diversion would "freeze" the corporation v. independent situation, and this the Board did not believe was the intention of the Act. The Minister does not dissent from this; but equally he does not believe that consideration of "material diversion" *would* have the effect of freezing the situation. The effect of this, it seems, is to fertilize the nettle of those undefinable words which have caused so much trouble in the past and which should never have got into the Act. It is a nettle which the Board—exercising its discretion—bravely grasped in its decision.

Foreigners' Traffic

Secondly, the Minister does not dissent from the Board's view that a second operator would have some effect of attracting traffic from foreign carriers; but he considers, "taking all the factors"—domestic and international—into account, "that this is highly problematical." This, of course, is his judgment against that of a Board which probed this question deeply, with the help of scores of documents and thousands of words of evidence.

The Minister goes on to say that fixed fares and standards of service make it difficult for a new carrier to generate new traffic, and he says that even if Cunard's selling organization, concerned as it is with both shipping and air transport, succeeds in tapping new sea traffic, "there seems no reason to suppose that . . . the new traffic . . . would be significant."

The Board heard much evidence on this point, too, and again it is the Minister's judgment against that of his expert authority. If the Minister is going to make judgments of this kind on such fundamental aspects of licensing, he may as well scrap the Air Transport Licensing Board and make all further decisions himself.

Much prominence has been given to the Minister's further comment that there are "too many seats chasing too few passengers." Transient air traffic trends should not be allowed to influence licensing decisions. Sir Fred Pritchard himself acknowledges the BOAC evidence of a slump on the North Atlantic during the current year, but says that he would have come to the same decision whether this evidence had been presented to him or not. The point is that air transport, like a child's temperature, is quickly up and quickly down. Can the Minister or anybody say for *certain* that next year on the North Atlantic there will not be too many passengers chasing too few seats?

The Minister could have directed the Board to re-hear the case, but he has decided that it will be "in the interest of the public and the parties to come to a final decision now."

To sum up, the Minister's decision is unfortunate not because an independent is not to be allowed to compete with a corporation, but because it is a decision that undermines the authority of the Board.

J. M. R.

Footnote: Mr Clive Hunting, chairman of the British Independent Air Transport Association, said about the Minister's decision: "It seems a pity that so much time, effort and money has been expended over a case that obviously could and should have been settled earlier. Presumably, this means that, by virtue of the corporation's present order book for new aircraft, no new licences of a competitive nature can now be granted for at least 'five or six years.' "

[*The Future of Cunard Eagle: see page 863*

As recorded last week, the Argosy earned revenue for the first time on commercial operations when, on November 17, BEA's first aircraft (G-APRM) flew 6½ tons of shoe-making machinery from Manchester to Paris. The load, consigned by a Leicester firm, is seen here going aboard by Rolamat conveyor. Full scheduled BEA Argosy operations, due to start on November 26, have been delayed by the loaders' strike

AIR COMMERCE...

FRUGALITY IN SCOTLAND

LOW-FARE pressures are coming from the new Scottish independent Caledonian Airways (Prestwick) Ltd, which was due to make its first charter passenger carrying flight yesterday, November 29, from London to Barbados; a second flight on December 12 to Lourenco Marques will carry members of the Overseas Visitors Club of London. Caledonian took delivery of the first of two 104-seat DC-7Cs leased from Sabena on November 15, and will fly 99 passengers of the St Margaret's Guild of Scotland to New York on December 21. Sabena will carry out all maintenance on Caledonian's DC-7Cs, thus enabling the Scottish carrier to take advantage of first-class maintenance without prohibitive capital expenditure on spares holdings and a large engineering staff involving high overheads—obviously a good point in persuading the Board of the adequacy of Caledonian's financial resources. Mr de la Haye, Caledonian's managing director, has said that his firm has received permission to operate a dozen group-charter flights to New Zealand. The company could offer transatlantic group charter fares of as low as £35 a head in the off season if a full load can be secured and adequate return loads arranged; such fares would be in the region of £80 during the summer months.

SAS TO CANCEL CONVAIR 990s?

THAT SAS is having second thoughts about its Convair 990 order was revealed recently by the airline's new president, Mr Curt Nicolin. He told aircrew that some 160 pilots and 40 navigators and flight engineers may be declared redundant next summer, depending on complete disposal of DC-7Cs and on negotiations to withdraw from its Convair 990 commitment.

SAS has two 990s on order and has arranged to lease two of the seven ordered by Swissair; a decision not to operate Convair 990s would involve not only the manufacturers but also Swissair, who were to have overhauled the Convair jets for SAS under the technical agreement signed three years ago between the two carriers.

Some adjustments to the DC-8/990/Caravelle fleet rationalization programme as originally planned by SAS and Swissair will obviously now be necessary, and it seems that there is simply not enough work to justify a third type of jet for SAS. This is borne out by the carrier's plans to cut services to New York from 21 to 14 flights weekly next summer, and services to Los Angeles from eight to six flights.

Three of the 14 DC-7Cs operated by SAS were traded in over a year ago to GALCO, a General Dynamics subsidiary, in part-payment for the two 990s on order, and were later sold to Riddle. Ten more SAS DC-7Cs have just been sold to Riddle, and all are due to be delivered to Miami this month. SAS also plans to sell the Hotel Royal in Copenhagen, in which it had invested £1.1m, and is reported to have received several US offers already.

CUNARD EAGLE WESTERN (continued from page 853)

of not only the most affluent Britons. Miami's hotel prices in the off-season are astonishingly cheap—$4 a night at a first-class hotel.

The terminal at Miami International Airport is truly vast; it takes about ten minutes to walk from one end to the other. Everything is under one roof and on one floor—all the airline counters, restaurants, coffee bars, an aquarium, and shops and concessions of every kind. The whole place, air-conditioned of course, is beautifully cool by contrast with the humid heat outside and in the fingers to the gates. All seems very quiet and relaxed; in this respect Miami airport (air-yard as it is known locally) is quite unlike any other I have been to—a remarkable impression for the world's third busiest airport to convey. It is not possible to look across the airport without seeing at any one moment at least three aircraft on the move—taking off, landing, or taxying. Soft music, as in all American airport terminals, enhances the feeling of quietude.

Everything seems to be arranged for the convenience of the passengers rather than for the convenience of the airport management. For example, not only is there a public observation deck on top of each finger, from which marvellous views of the busy ramps are available; if you haven't got a dime for the turnstiles, there is a change machine conveniently at hand. And there is not one single notice anywhere saying don't do this or don't do that.

I wanted to take some photographs; I hadn't got much time before my flight, and I did not know what to do about obtaining permission. So, with some trepidation, and taking care to be as unobtrusive as possible, I walked out on to the apron for a few minutes. I took all the pictures I wanted, and nobody minded or even noticed. The absence of officiousness was remarkable, considering the security aspects of hi-jacking, with Dr Castro & Co only 50 miles away.

It was strange, too, to be able to drive round the airport and pull off the road anywhere and just wander around among aeroplanes, hundreds of them, of varied type and vintage and rare markings: C-46s and DC-4s belonging to obscure Latin American operators; the black "free Cuba" B-26 that bombed Havana a few months ago; a gaggle of Northrop Raiders in Mexican civil markings; a dozen retired Logair C-46s; an Imperial Airlines Constellation; half-a-dozen mothballed PanAm Stratocruisers. Only the Pan American maintenance area is fenced off; everywhere else is open to anyone who enjoys pottering about among aeroplanes.

Miami's greatest attraction is the Seaquarium, a zoo for sea animals (they don't call them fish). At the mention of the name Cunard Eagle we were given a personally conducted tour by the manager himself. (" It sure is good to have you with us," he said.)

We were just in time to see the sharks being fed with fish dangled from a rope—a fearsome spectacle, traumatic in its effect on those spectators who were thinking of going swimming in the bay later in the day. The uncanny intelligence of the porpoises, which leap 12 feet out of the water and pluck a cigarette out of a keeper's mouth, is hard to believe even when it is seen. The only aspect of the Seaquarium that grates is the commentary, which is constant and all-pervading, battering the senses and dulling one's appreciation of a place that speaks for itself as the world's most wonderful aquarium.

From Miami it is but a 50-minute hop on the Cunard Eagle Viscount frequent shuttle service (with complimentary rum swizzle) to Nassau. I did not stay there very long, just two days and a night, but long enough to be charmed by the old town, by the soft pink beaches and the warm blue sea—so clear that from an aeroplane you can still see the bottom miles from the reefs. At night the chirruping of the tree-frogs sends one to sleep, and by day curious buzzing noises can be heard in the tops of the palm trees. "That buzzing noise," I said to Cunard Eagle's man in Nassau, Mr Jean Savage; "it sounds like a monkey using an electric shaver." "That's right," he said, "that's just what it is." And he and Mr Joe Smith, one of the airline's youthful American sales reps, went on telling me about Cunard Eagle's promotional-fare policies.

I cannot close without paying a sincere compliment to this airline's cabin service. It is dispensed with rare charm, not just to non-rev passengers like me, but to every revenue customer also. Whether these are fractious old ladies wanting cotton wool for their ears or small boys wishing to play tanks in the aisle when breakfast is being served, they are the first and final reason for an airline's being.

Postscript Since these articles were written, the Government has vetoed Cunard Eagle's North Atlantic licence. It has done so on the grounds that BOAC, who ordered additional Boeings during the ATLB hearings, has purchased adequate aircraft capacity. I can well appreciate the bitter disillusionment of Cunard Eagle and of its parent—disillusionment that must amount almost to a feeling of betrayal.

My own reaction is one of regret that the name Cunard, a national asset which in America has the prestige of the name Rolls-Royce, is not to be allowed to serve Britain in the air as it has for so long (until air transport intervened) on the sea. This seems not only unfortunate, but unjust.

LORD DOUGLAS ON EUROPEAN AIR TRANSPORT

HERE we continue and conclude our summary of the RAeS British Commonwealth Lecture by BEA's chairman. The first part appeared last week, on pages 794-795.

THERE has been a marked improvement in the relationship between European governments in recent years, particularly in the recognition that air services should be developed on a regional basis rather than by an unco-ordinated series of bilateral discussions. Governmental co-operation is essential in Europe for the safety and efficiency of airline operations. Eurocontrol was an example.

Although European aviation co-operation at Government level, said Lord Douglas, has made some encouraging advances in the past few years, co-operation between the airlines has been even more impressive. Co-operative schemes have been worked out in commercial affairs, scheduling, traffic handling, maintenance, supplies, communications, research and accounting. The reasons for this profound interest in airline co-operation are not difficult to find. The productivity of each new jet aeroplane is so much greater than their predecessors that nearly all airlines require a smaller fleet of aircraft than they had previously. For smaller airlines this creates some very difficult economic problems because fleet sizes are reduced to the point where there are major economic penalties of small scale operations. The pressures towards co-operation are then irresistible. But even for larger airlines the benefits to be gained from co-operation are very considerable, particularly because the larger capacities of new aircraft make it more difficult for an individual airline to maintain adequate frequencies on many routes. This is one of the reasons why there have been strong pressures towards even more comprehensive pooling agreements in Europe in recent years.

Because they rationalize the basic commercial relationship between the airlines concerned, pool agreements pave the way for other forms of airline co-operation. On the other hand, pooling agreements do not eliminate all competition between the airlines.

The main form of co-operation between the members of Air Union (said Lord Douglas in discussing forms of European airline co-operation) must be in the commercial rather than in the technical field. The increase in the size of long-haul aircraft makes it very difficult for airlines individually to maintain the frequency of service which they regard as desirable on their major routes. Rationalization of schedules is one of Air Union's major objectives; it is a large scale, multilateral pooling agreement between the airlines concerned. There is not the same imperative need for BEA to seek technical co-operation with other airlines as there is for smaller operators. On the other hand BEA is in a position of being able to offer technical assistance to smaller European airlines, and to gain substantial commercial advantage by this co-operation. This is the background to the consortium agreement with Olympic Airways and TAP.

There are many other less-publicized co-operative arrangements which are of great importance for efficient and economic airline operations. The Air Research Bureau, Société Internationale de Telecommunication Aéronautique, revenue accounting, traffic handling, technical training, purchasing and spares pooling were all examples.

BEA's Rôle

BEA can claim to have made a fundamental contribution to the post-war development of European air transport. During 1960 BEA carried 60 per cent more traffic than the next largest intra-European carrier and more than six times as much traffic as the next largest airline operating solely within Europe. It is now generally accepted that short-haul and long-haul air services are quite different commodities. Specialization has been an important element in both BEA's success and BEA leadership in Europe.

BEA's position as the largest carrier of European air traffic has also been influenced by the fact that the airline's network radiates from Europe's largest traffic generating centre, London. This has, at the same time, made for fierce competition on BEA's international routes, since most foreign carriers regard London as the "plum" route on their European networks. The resultant intensely competitive situation has undoubtedly given added impetus to BEA's endeavours.

The factors which have influenced the growth of BEA's passenger traffic are basically those which have influenced the post-war growth of European air traffic generally. BEA's fares have followed a trend similar to that for all European airlines. In contemporary values, the average BEA fare per passenger mile is roughly the same today as it was 14 years ago. Expressed in real terms, BEA fares have been reduced by 40 per cent during the period.

Financially, BEA's best year was 1959/60, when profit after interest was over £2m. BEA's profit in the latest financial year, 1960/61, was £1¼m., revex ratio (relationship between revenue and expenditure) 104. This compares well with a revex ratio of 101 for all the world's airlines in 1960, as published by ICAO. Moreover, the ICAO figure is before charging interest on capital, for which the BEA 1960/61 equivalent would be 107.

In common with other airlines in many parts of the world BEA is experiencing financial difficulties during the current year. We shall most likely be obliged to call upon some of our reserves in order to balance our accounts at the end of this year.

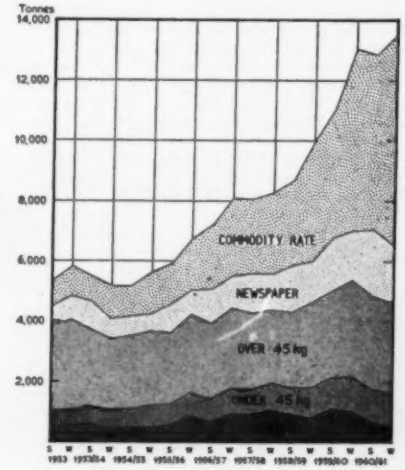
The reasons behind BEA's reduction in unit costs are numerous, but there are five factors which have made the greatest contribution to this achievement. They are: (*a*) The use of aircraft designed specifically to meet BEA's particular needs (Viking, Viscount, Vanguard, Ambassador and Trident); (*b*) increased utilization of aircraft (1,990hr average in 1960/61); (*c*) increased staff productivity (a six-fold increase in fourteen years); (*d*) economies of higher intensity operations (and increase in average aircraft productivity to 1,210 ctm/hr) and (*e*) effective economic planning and financial control.

BEA, said the lecturer, has led the way in pioneering technical developments within the industry. The most notable achievement in this direction was the introduction into regular scheduled service of the Viscount in April 1953. In developing its fleets of British aircraft BEA has maintained a very close liaison with the manufacturing industry, thus providing it with that essential "feedback" of operator experience which is a vital factor in aircraft manufacture. This liaison has unquestionably helped the British aircraft industry in its endeavours to capture world markets.

That BEA has been a leading airline in the technical field (Lord Douglas gave a number of examples) is readily apparent. But it is not so widely appreciated that the corporation has also established a world-wide reputation within the airline business for being a leader in commercial matters. To give an adequate public service an airline must produce more capacity than it is able to sell. It may be slightly misleading to call all of this unsold capacity of the airline "waste," but whatever we call it, this gap between sales and maximum potential capacity is a major economic factor in scheduled air transport. BEA has made it a primary objective of its commercial policy to sell as much as possible of this capacity which would otherwise be wasted. Last year, BEA operated at a load factor a good deal higher than the European average, but had unsold capacity of 35 per cent. There is also the unsold capacity which the airline was potentially capable of producing if it had had an even flow of demand at the peak level throughout the year. This is over-simplified because we could not, in fact, maintain our peak months output all the year round; nevertheless, potential output is wasted because of the seasonal pattern of traffic demand.

BEA's commercial policies have tried to reduce waste capacity in two ways: by pricing policies designed to maximize off-peak demand, and by the rationalization of capacity to ensure the highest practical level of load factor. BEA has given a lead in the adoption of tariff policies designed to influence off-peak demand. There has grown up a network of night services which now covers over 60 per cent of BEA routes. Lower fares have also been introduced for mid-week travel on those routes on which traffic peaks at the weekends. Fare differentials have been introduced on some routes in the night fares, as well as the day fares, for midweek and weekend travel. And this year we have taken a new step with the introduction of even lower fares to encourage travel in the slack months of spring, early summer and autumn.

Another major commercial policy is pooling with other airlines



BEA's freight traffic over the years, broken down by rate classification

One of the three Piaggio P.166s of Patair (Papuan Air Transport) seen being loaded at Tapini in New Guinea. Patair's first P.166, VH-PAT, has logged 2,400hr on "whistle stop" operations from rough strips in a little over a year. Patair's later P.166s have a double freight door ahead of the wing leading edge

AIR COMMERCE...

on routes operated in parallel. The overriding argument in favour of pooling agreements is that they make possible a joint planning of the capacity on the pooled routes, giving a good spread of services throughout the day. This is not always easy to achieve. There may be conditions in which the other airline on the route is willing to accept a much lower load factor than we think desirable. But, by and large, our pooling agreements have been highly successful; and there can be no doubt whatever that our load factors would have been much lower without them.

After saying that he did not intend to join the already swollen ranks of air traffic forecasters, Lord Douglas went on to say that there is no doubt that the volume of air traffic within Europe will continue to expand rapidly during the next decade. A gradual reduction in real air fares and a continuing increase in the level of European incomes will continue to bring the price of air travel within the reach of many more people. "I expect," he said, "to see an expansion during the next decade to two or three times the 1960 traffic level."

Only the surface is scratched of the very short-haul market, on stages of below 200 miles. Nevertheless, the volume of air traffic on some routes within this category indicates that even under present conditions large numbers of people are prepared to travel by air over these short distances. In 1960, for example, four European routes with stage lengths of about 150 miles carried over 100,000 passengers, These were London - Manchester (180,000), Berlin - Hanover (155,000), Geneva - Zürich (134,000) and Copenhagen - Gothenburg (120,000). Between Copenhagen and Malmo, a distance of only 16 miles, 93,000 passengers were carried in 1960.

Excessive journey time on the ground is a problem both on short-haul routes and—albeit a less serious one—on longer-haul routes. Operation between city centres by helicopters is not feasible on such routes. A rail or monorail link is urgently needed between London and London Heathrow Airport, now used by over 5m passengers a year. BEA would fully support such a link, and is prepared to contribute a million pounds towards the investment in a monorail serving London (Heathrow) Airport.

With the advent of subsonic jets, civil aircraft development has reached an important milestone. Personally, Lord Douglas concluded, I believe that on short-haul European routes we should now mark time on speed increases and catch our economic breath. European airlines ought not to think of supersonics for at least the next decade. Supersonic aircraft will not give any worthwhile time savings on routes of below 500 miles and are unlikely to be of much benefit over distances of less than 1,000 miles. In the 1970s we shall perhaps see supersonic aircraft coming into service on the long-hauls, subsonic jets still dominant over the medium and short-hauls and helicopters or more advanced VTOL aircraft becoming increasingly important over very short distances.

SPANISH MILLIONAIRE

DURING the current year Iberia will have joined the select band of airlines which carry more than a million passengers a year. The report and accounts for 1960 show that the company only just failed to qualify for membership last year, the number of passengers carried having amounted to 953,000. Three out of every four of these passengers were carried on domestic flights, mostly on the Spanish mainland. On a passenger-mile basis, however, Iberia's business was divided equally between domestic and international.

This traffic brought in just over Ps1,500m, with the international routes (because of higher average fare levels), contributing two-thirds of this. The majority of total revenue—again the proportion was two-thirds—was earned in foreign currency, with foreigners accounting for nine-tenths of Iberia's international traffic and one-third of domestic traffic.

These receipts from foreigners are, from a balance-of-trade point of view, equivalent to exports which would disappear were Spain to depend on foreign airlines for its air connections with the outside world. It is for this reason a sound economic policy for the Spanish Government to develop Iberia and to inhibit foreign airlines from encroaching too much on the Spanish travel market. But whereas many airlines would have exploited the situation by persuading the government to subsidize their activities, Iberia happens to have one of the best profit records of any European airline. In 1960 this company showed a profit, after meeting all charges including interest payments, of Ps58m (£350,000). For a year in which most of Iberia's rivals had got in first with the latest jets, this result was very satisfactory.

During the year much of the airline's efforts were directed towards preparing for its three DC-8s. These are now taking over the long-haul services, principally those across the North Atlantic. During the year an extensive evaluation of short-haul types took place and this culminated in an order for four Caravelle 6s. These will be delivered next year and will take over the more important Convair Metropolitan and DC-4 services. As the existing fleet has been almost fully depreciated, the advent of these two new types is having a dramatic effect on the airline's balance sheet. The net value of the enterprise, for instance, will almost treble from some Ps1,300m (£7m) to Ps3,700m (£22m). This will apparently be financed, not by the injection of fresh capital, but by the extension of credit—to a large extent by aircraft manufacturers.

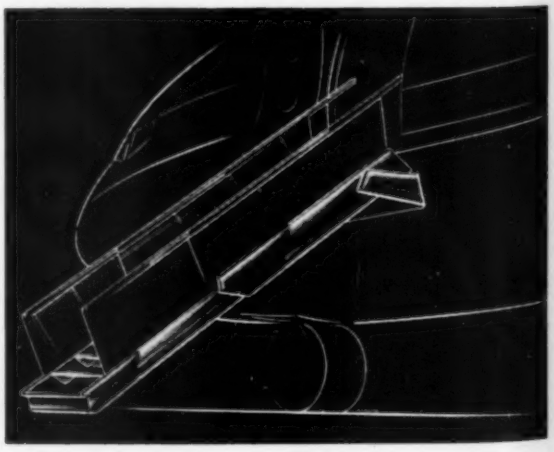
GOODBYE TO OVERHAUL LIFE?

ONE of the most important indices of powerplant reliability and safety, engine overhaul life, is to be abandoned by six US airlines for a six-month operational evaluation period beginning on December 1. In its place will be substituted a new index developed jointly with the FAA.

A reliability index has been established for each airframe and engine combination, and an "alert value"—the rate of total engine shutdowns per 1,000hr—is set for each combination. This takes the place of the overhaul life; when the shutdown rate is exceeded, the FAA and the airline concerned will work together to restore it.

The six-month trial period, in which TWA, United, Continental, American, Riddle and Piedmont are participating, will deal only with propulsion system maintenance. If it is found that the new reliability yardstick is better than minimum overhaul times, it will be applied to all airlines and extended to other aircraft components.

Airlines are to submit a monthly report covering the most recent three months of in-flight shutdowns; and those causing structural damage, disintegration or fires or adversely affecting control of the aircraft will be reported to the appropriate FAA inspector. Close co-operation between the airlines concerned and the FAA will be maintained at all stages.



This unusual telescopic stairway is optional equipment on the Boeing 727. Extending or retracting in 20sec, it is the subject of a $670,000 design contract awarded to the Weber Aircraft Corporation. Production of 40 sets has been ordered and first mock-up is soon to be delivered

Seen here at Kolwezi Airport, headquarters of the Katanga Air Force, are some of the latter's aircraft which have been assisting to push back Congolese troops attempting to invade Katanga territory. Behind the Fouga CM.170 Magister and the two Dornier Do 28s is a Katanga DC-3 inscribed "Courrier-Service" and registered KA-DFN

THE FUTURE OF CUNARD EAGLE

SIR FRED PRITCHARD'S report on BOAC's appeal against Cunard Eagle's North Atlantic licence was presented to the Minister on October 10. Nine days later—actually (it now transpires) while the Minister was studying it—Sir John Brocklebank, chairman of the Cunard Steam-Ship Co, said that he was re-assessing Cunard services on the North Atlantic and that "the first object of the re-assessment will be to put an end to the losses which are now being incurred . . . The extent of Cunard's investment in air transport and its relation with Cunard's shipping interests will be the subject of close examination."

The clear implication of this statement was that Cunard was having second thoughts about its investment in Cunard Eagle. Whether intentional or not, Sir John—by making such a statement at such a time—must have given many people the impression that he did not regard Cunard Eagle's North Atlantic licence as an issue of paramount importance. To what extent this impression weighed with the Minister in determining the fate of Cunard Eagle's licence will never be known, but it is probable that it had some effect.

Cunard Eagle's order for two Boeing 707-420s, which are now taking shape on the production line at Seattle with Cunard Eagle labels on them, is a firm commitment with no escape clause. It is significant that these two aircraft, which will be ready for delivery early in the new year, were being offered more than a month ago to other airlines. Among these, it is said, was BOAC. Perhaps this has no more significance than an effort by an airline to dispose of equipment, temporarily or permanently, in the event of a new route not being obtained. At any rate, the aircraft are now for sale.

Cunard Eagle has been suffering heavy losses on its operations during the past year; although no figures are published, losses at the rate of more than £500,000 a year have been unofficially reported in the Press. And on October 19 the airline took the surprising step, while the Air Transport Licensing Board was considering its European applications, of cancelling its services between Manchester and Hamburg and Manchester and Copenhagen for the winter.

The Minister's decision, contrary to that of the Board, that Cunard Eagle shall not have its North Atlantic licence is bound to jeopardize the Cunard/Cunard Eagle association. Cunard is obviously reluctant to discard its air transport subsidiary, upon which rests its only long-term hope of retaining traffic that is being lost to the air. Suggestions that, because of mounting losses, Cunard was in any case getting cold feet about the heavy cost of developing transatlantic jet operations, may have a germ of truth in them. But there is for this shipping company an alternative to getting out of air transport (an action which obviously would not make long-term commercial sense)—talk of shipping-company mergers which could result in mergers among their airline subsidiaries. One thing is certain: the name Cunard, which is a 190-year-old national asset, must be kept flying.

INDEPENDENT SAFETY DEBATED

IN spite of the public anxiety aroused by recent accidents, only 29 minutes could be devoted to debating the subject of independent safety in the House on November 14. Mr Roy Mason (Lab, Barnsley) raised this question on the adjournment and expressed some concern about the independents' safety record. He quoted a safety survey made on two occasions by the Institution of Professional Civil Servants in which 800,000 movements in and out of UK airports during 1951-55 were checked; the number of accidents per movement in that period was five times higher for charter than for scheduled services. The second survey in 1958 showed the charter accident rate was 7½ times worse, but Mr Mason did not say what index of safety this survey employed. He also quoted from *Flight's* October 19 analysis of the comparative corporation/independent safety record, and expressed the opinion that the Board would not prove effective in scrutinizing the independents' aircraft or charter operations.

Mr Gresham Cooke (Cons, Twickenham) expressed some concern about the age in years of aircraft such as the DC-3 used by the independents, while Mr Chetwynd (Lab, Stockton-on-Tees) thought that at present accident investigations took far too long and that there was a need for spreading knowledge gained from these investigations not only among technical people but among a wider section of the public. Mr C. M. Woodhouse (PPS to the Ministry of Aviation), after explaining existing safety regulations and the air operator's certificates, said that the Minister had concluded that a general enquiry into safety would not be an appropriate step to take at this time, since the system of air operators' certificates has not yet had a chance to prove itself. This system, said Mr Woodhouse, could be sharpened if necessary.

NEW SCOTTISH OPERATOR

A NEW Scottish operator, Black Isle Air Services, has applied to the Air Transport Licensing Board for a number of services radiating from Inverness. The new carrier's address is Transport House, Beauly, Inverness, and services to Glasgow, Edinburgh and Prestwick have been applied for.

Up to six services a week in each direction are envisaged, connecting with trunk services at the Scottish terminals, and a Piper Aztec is to be used; Black Isle has leased aircraft from Capital Services (Aero) Ltd of Renfrew in recent months. Proposed return fares are £7 to Glasgow, £7 10s. to Edinburgh and £10 10s to Prestwick, and freight and mail would also be carried.

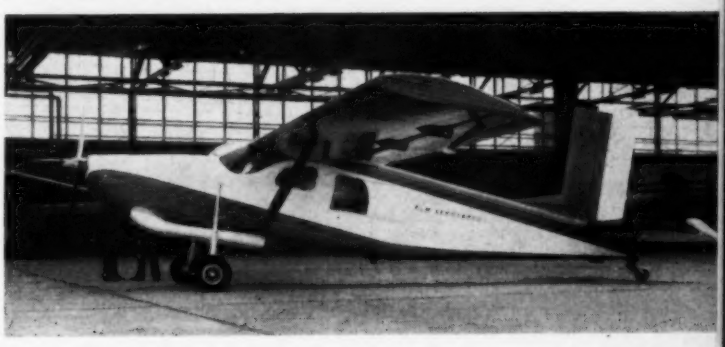
Other routes applied for are Inverness - Stornoway - Benbecula at a peak frequency of four flights weekly, and Inverness - Dornoch (optional) - Orkney - Shetland at up to 12 flights weekly. An Aztec would be used initially on these routes and a Rapide later.

JET NOISE OMBUDSMAN?

IN a recent adjournment debate of some 2½ hours on noise (the first on this subject since June 1960), MPs whose constituencies are affected by jet noise made some effective points. Mr Royle (Cons, Richmond) thought that much more could be done by the Minister to improve public relations, and he asked the Minister to consider the appointment of a special commissioner—preferably a senior civil servant—with responsibilities within the Ministry for co-ordinating aircraft noise research and information, and to publicize efforts by the Government on this issue. Such an official would receive public complaints, play an important part in running the noise monitoring system, and issue details of what the Ministry was doing.

Mr Royle wanted to know what penalties had been exacted from pilots and airlines involved in breaches of the height regulations during the past 12 months. "We have never been able to discover this from the Ministry," said Mr Royle. Mr Dudley Smith (Cons, Brentford and Chiswick) supported the idea of an Ombudsman for noise, and thought that the Ministry ought to publish the results of regular monitoring.

Mr Skeffington (Lab, Hayes and Harlington) said that the way in which permission had been given for the Swissair and SAS night jet services "created a suspicious and uncertain feeling among constituents"; these services had been advertised in the timetables before the Minister had finally given his permission. Several other members expressed concern that the height regulations were not, perhaps, being observed as strictly as they should be, and the effects



This is the Pilatus Porter which, as already reported in these pages, has been ordered by KLM for photographic survey work by its subsidiary Aerocarto. Colours of the aircraft, PH-OTV, are red and white

The Short Skyvan prototype is now in an advanced stage of construction at Queen's Island, Belfast. Construction of the fuselage and wings is now nearly complete and the Continental engines are due to be installed in the next few weeks. First flight is scheduled for next spring

AIR COMMERCE...

of jet noise on schools was pointed out. Mr C. M. Woodhouse said that out of 860 approaches checked, only 13 were below the correct glide path, representing a little over 98 per cent compliance with height regulations. More radar sets were to be used in this operation, thus obtaining a larger sample. A pilot who offends against the height regulations is liable to a £200 fine or six months' imprisonment, but no prosecutions had so far been made because there has never yet been a case of the same pilot offending twice. Automatic monitoring equipment was to be installed during the next year or two "at quite heavy expense" to enable practically every take-off to be monitored. Mr Woodhouse undertook to look into Mr Royle's suggestion for a noise commissioner, and to see what could be done to improve on present public relations.

PANAM/MEA AGREEMENT

ONLY a few months after Middle East Airlines ended its somewhat chequered *entente* with BOAC, PanAm has renewed a former association with the Lebanese carrier by entering into a general sales agreement providing representation and sales facilities for each carrier in certain of the other's major markets. The agreement becomes effective on January 1, 1962, and covers the sale and handling of passengers, mail, express or cargo under IATA regulations.

In 1949 PamAm acquired 36 per cent of MEA's stock but withdrew from the company in 1955, when the association with BOAC began. The US airline has no plans at present to acquire a holding in MEA, but such a holding might come about at some future date if MEA needed to invest heavily in new equipment.

THE GREAT DIVIDE OPENS

THE "great divide" envisaged by Mr Peter Masefield between high-speed travel at premium fares and slower, lower-cost air transport is already making itself felt on the North Atlantic, where jet load factors are falling and charter traffic is booming.

According to one estimate, as much as 30 per cent of all transatlantic passenger traffic has been carried on charter flights in recent months, and an informal meeting of IATA carriers was held in New York on November 10 to discuss the possibility of introducing group-travel discounts. This follows similar meetings to discuss the problem in June and July (see *Flight*, June 22)—notwithstanding IATA's two-year fare freeze earlier in the year. But a mail vote taken in September failed to gain sufficient support for group discounts. IATA carriers at the latest meeting are reported to have included PanAm, TWA, TCA, SAS, KLM, BOAC, Lufthansa and Air-India, and there is hope that a further mail vote will enable group discounts to be introduced in time for Christmas.

Meanwhile, Seaboard World Airlines is continuing to press hard its proposal to carry "top-off" passengers on its Canadair CL-44 cargo flights across the Atlantic for a return fare of only £47. No meals would be served and passengers would be carried only if there were room after cargo and mail was loaded; seat reservations would not be made but ticket holders would be notified, six hours prior to departure time, of seat availability.

TWA has asked the CAB to reject Seaboard's proposals on the grounds that the latter had "failed to demonstrate any public need" for the service. Although Seaboard should be able to achieve a profit with scheduled CL-44 freight services, the all-freight carrier points out that the danger is in the transitional period when CL-44 capacity is exceeding freight traffic. The airline considers that a "critically dangerous financial crisis" will occur during the early stages of CL-44 operations. "Top-off" passengers would, it is argued, afford the necessary extra revenues without interfering with the basic objective of profitable transatlantic freight services; and Seaboard points out that it has never had any government subsidies—unlike its passenger-carrying competitors at critical stages in their development of passenger services.

Although a subsidy might now be justified, Seaboard says it would prefer to rely on the skill and imagination of its management to develop new concepts that meet public needs and generate the supplemental revenue required in the critical stage ahead.

BRITISH UNITED'S REACTION

DURING the ATLB hearings last week into the British United and BOAC applications for new African routes (see *Flight* last week), counsel for British United, Mr Gerald Gardiner, QC, (who had also represented Cunard Eagle at the BOAC appeal) said that he had been instructed to apply for an adjournment *sine die*. He said that the Board, in their decision on the Cunard Eagle application, had accepted the evidence of Sir Basil Smallpeice that BOAC had undertaken commitments to purchase aircraft to deal with all the traffic reasonably to be expected on the North Atlantic and other routes during the next five or six years; and it was because of this that the appeal commissioner had recommended, and the Minister had decided, that BOAC's appeal should be upheld. Such a decision, said Mr Gardiner, made a farce of the Act and of hearings by the Board. The corporations could go on ordering aircraft to deal with expected traffic year after year, pleading this as a financial commitment reasonably entered into.

Mr Gardiner said that his instructions, if the Board should not grant an adjournment, were to withdraw. He emphasized that this was not in any sense a threat; it was possible that, during the adjournment, the intentions of the Minister might be clarified. On the other hand, if the attitude indicated by the Minister's decision were maintained it would be useless to apply to operate on any route where the corporations already had services. He said that the Board, each member of which was an expert in a relevant field, had heard all the evidence put forward at the Cunard Eagle/BOAC hearing; it had carefully considered it and had made its decision. This decision had been reversed by one man (an appeals commissioner), who, however distinguished, was not an expert in these matters; and the reversal had been confirmed by the Minister.

The Hon Mr Henry Fisher, QC, counsel for BOAC, said that the request for an adjournment had come as a complete surprise; the decision of the Minister was, under the Act, final. He suggested that Mr Gardiner's request had been in the nature of a political address. Mr Gardiner took the gravest exception to his learned friend's suggestion.

Mr F. J. Nance for Starways and Mr H. Marking for BEA both felt that there was no case for an adjournment.

The chairman then announced that the Board would retire for 15min to consider the request. When the Board reassembled Mr Gardiner made a further statement, saying that the present case was not on a different footing from the Cunard Eagle Atlantic application; BOAC were again objecting on the grounds of expenditure on aircraft. In the BOAC appeal just decided the Minister had agreed with the recommendation of the commissioner on these grounds. Neither the commissioner nor the Minister had considered the fact that BOAC, in May, during the hearings before the Board, had ordered a further three Boeing 707s. In the present case jigs had been made for the BAC One-Elevens ordered by BUA and the first two VC10s of their £11m order were numbers 8 and 9 on the production line.

If the decision to uphold BOAC's appeal on the basis of their commitments for aircraft was correct then the independent companies had been wasting their own and the Board's time. Mr Gardiner emphasized that there was no implied criticism of the Board, who had always extended every courtesy and shown every consideration to the applicants. He felt that if the Board granted an adjournment this should be until after the decisions on the European applications and any subsequent appeals were known.

The chairman announced that the hearing of the present applications must continue or they must be withdrawn. Mr Gardiner said he must, with personal regret, therefore withdraw.

Footnote Having been heard before the withdrawal, British United's application for a West African coastal service to Lagos (objected to by BOAC) presumably still stands. Two interesting pooling points came up during the one-day hearing: (1) Revenue as well as capacity in the BOAC/Nigeria Airways pool is shared 50 : 50. (BOAC took the unprecedented step of giving British United, as well as the Board, confidential copies of its pool agreements with Nigeria and Ghana Airways); (2) British United, though "having no passionate attachment for pools," agreed to pool the London - Gibraltar sector with BEA in return for a withdrawal of the corporation's objection to BUA's application.

European-route decisions announced: page 838; Minister upholds BOAC appeal: pages 859 and 860; Cunard Eagle's future: page 863; leading article: page 837.

AEROLINEAS COMET 4 TRAGEDY

AN Aerolineas Argentinas Comet 4 bound from Buenos Aires to New York crashed at about 0300hr on November 23 shortly after take-off from Vira Copos Airport, Campinas, 240 miles west of Rio. All 40 passengers and 12 crew members on board lost their lives. This was the first accident to a Comet 4, 4B or 4C to cause fatal passenger injuries.

A New York spokesman of Aerolineas said that the Comet "exploded" at a height of about 2,000ft and came down in pieces. Other reports say that the Comet appeared to be returning for an emergency landing with fire in one wing. Campinas is used as an alternate to Sao Paulo, since the airport there has longer runways and usually better flying weather. This is the third of six Aerolineas Comets to be lost; one was badly damaged in a forced landing near Asuncion, Paraguay, on August 26, 1959, in which the captain was killed and an elderly woman passenger later died of shock. A second caught fire at Buenos Aires on February 20, 1960, after making a heavy landing during a training flight; the crew of nine escaped.

Footnote A Comet 4 of Aerolineas Argentinas left Buenos Aires on November 26 carrying President Frondizi of Argentina on a 32-day world tour.

EUROCONTROL DEBATED

SOME important points, especially financial, were made in the debate on November 17 on the Civil Aviation (Eurocontrol) Bill's second reading. Explaining that this Bill arose from a Convention between the UK, France, Belgium, the Netherlands, Luxembourg and West Germany, Mr Thorneycroft went on to explain the salient features of Eurocontrol. We would be spending about £7m a year on airport technical services and *en route* services. By airport charges and rents we were raising £9m-£10m annually for non-technical airport services and depreciation. When setting up Eurocontrol it would be necessary to find a new method of financing navigational equipment, and Clause 4 of the Bill enabled the Minister to raise money and make regulations requiring payment to the Minister or to Eurocontrol of charges for navigational service—i.e., *en route* charges. The Minister reiterated his belief that such services should not be provided free.

Mr Chetwynd (Lab, Stockton-on-Tees) thought that Italy, Switzerland and Eire ought to join Eurocontrol; the Convention was open to other countries. He hoped that a provision would be inserted requiring the Minister to lay before the House an annual report from Eurocontrol. The Minister should "go a little carefully" on *en route* charges, as airlines were now going through a fairly thin time.

Mr Woodhouse (PPS to the Ministry of Aviation) made the point that this was the first occasion that this country has joined a purely European institution as a founder member, and that Eurocontrol was open to other countries, particularly non-NATO countries. Mr Woodhouse thought that Italy's decision to drop out arose from the problem of reconciling civil and military requirements. Britain's financial contribution to Eurocontrol would be almost exactly one-third of the whole, and our voting equivalent to ten votes out of 37 for the six countries. Mr Woodhouse described Eurocontrol as "not a loss of sovereignty but a pooling of sovereignty and a shift of sovereignty at the edges."

SAFETY, ECONOMY, COMFORT

(Continued from page 842)

Which reminds me: Do you think it is good for air transport that obsolete aircraft, when they pass to the charter companies, should be flown more intensively, for the holiday season at any rate, with higher average load factors, than ever they were as new machines in regular service?

The chief difficulty with these older machines, I think, is the lack of pressurization. It would be better if they could get above the weather when necessary. Then, as to safety conditions generally, it is for the pilot to decide when to fly and when it is not fit to fly.

Is there an increased risk if the pilot has to decide every time just inside the limits of tolerance; isn't the present competition in the charter field continually cutting into the margins of safety?

It is up to the new Licensing Board to ensure that licences are only given to companies who keep to the rules about flying hours, and so on.

Do you think we have struck quite the right kind of system for licensing the operator?

I should have thought we have much the same system now as in other countries.

Are there not more part-time amateurs involved here, as compared with, say the professionals of the CAB in America?

With the professionals you may get the bureaucratic approach. It is awfully difficult to say.

Don't you think it might be useful to have another committee look at our national air transport policy and make recommendations; something with terms of reference between those of the Brabazon and the Finletter committees? Or better still, what about an international committee to see if we could co-ordinate requirements at least between the Commonwealth, Europe and America?

Committees tend to take their views from the chap who shouts loudest. We ought to make progress without another formal inquiry. There is still something to be said for Tennyson's lines:—

> A land of settled government,
> A land of just and old renown,
> Where Freedom slowly broadens down
> From precedent to precedent.

Our freedom works because each individual knows the limit to which he can go. Within those limits I agree we can probably do much much more than we are doing at present.

* * *

Maybe it was too much to expect the arch-individualist, Sir Frederick, to agree to a committee; but nothing he said completely discounted the proposal that we should find it worthwhile to have air transport policy re-examined afresh.

He spoke as a constructor—and one with a very independent turn of mind; I look forward to putting similar questions to others, including Lord Douglas, as an operator, and Lord Brabazon, who might well be described as the guardian of the public interest.

Taking shape at Weybridge is the first Vickers VC10, due to fly next year and the largest airliner to be put into production built in Britain. By comparison Skyvan (opposite) is the smallest new British transport

BREVITIES

Airtech Ltd of Aylesbury has acquired the undertaking, assets and business of Chartair Ltd and has increased its own capital to £250,000.

Blackpool Town Council has decided to buy Squires Gate Airport from the Ministry of Aviation for £185,000. The airport is to be vacated by the Ministry in March.

A Viscount 768 of Indian Airlines Corporation crashed on landing at Ratmalana Airport, Colombo, on November 15 and was extensively damaged. There were no injuries to the five crew and 31 passengers.

A DC-3 of Rhodesian Air Services (Pvt) Ltd, on charter to the United Nations, crashed on take-off from Salisbury Airport, Southern Rhodesia, on November 22, killing two of the crew and injuring the stewardess.

Mr N. Monnickendam, chairman of Tradair, has instructed solicitors to start proceedings against Wg Cdr A. D. James concerning an allegation, quoted by Mr Strachey (Lab, Dundee, West) in the Commons on November 23, that a Tradair pilot had been dismissed after making a night stop at Pisa due to bad weather.

Flying Tiger's Canadair CL-44s used on MATS operations in the Pacific have been achieving utilizations of up to 11¼ hours daily. During the week November 4-10 the five CL-44s used on the Burbank - Tokyo route logged 80hr 53min, 77hr 0min, 67hr 58min, 48hr 59min and 36hr 59min respectively.

An Aero Commander 680 owned by Bay of Plenty Airways Ltd crashed on Mount Ruapehu, about 150 miles north-east of Wellington, New Zealand, on November 21 with the loss of the pilot and all five passengers on board. The aircraft was on a scheduled flight from Wellington to Rotorua and (according to eyewitnesses) appeared to have lost a wing.

Ministry of Aviation expenditure on assistance to the development and proving of transport aircraft in 1960-61, according to figures given in the Commons recently by Mr C. M. Woodhouse, was about £7¼m. Royalties in the same period amounted to £2¼m. Expenditure in support of municipal airports was approximately £1.1m, and cost of state airports was £3.8m.

Silver City is to lease from Maitland Drewery, with an option to purchase, three Viscount 708s for delivery within a month's time. They will be used on existing DC-3 and Hermes passenger schedules, on inclusive tours, and on the new passenger services from the north to Le Touquet for which licences have been granted and which will be inaugurated next summer.

ICAO and OEEC are engaged, Mr C. M. Woodhouse told the Commons on November 20, in fundamental research into jet noise, aspects of which are considered also by the Western European Airport Authorities Conference. He hoped that this work would provide the basis for an international convention on jet noise, though this would take some time.

Shackletons of 42 Sqn at Belize, British Honduras, during relief operations following the Hurricane Hattie devastation (this page, November 9)

SERVICE AVIATION

Air Force, Naval and Army Flying News

New Wessex Squadron

SECOND Westland Wessex squadron in the Royal Navy, 814 Sqn was being commissioned at Culdrose last Tuesday (November 28). Commanded by Lt Cdr L. J. B. Reynolds, the squadron is due to embark in HMS *Hermes* in the late spring of next year.

Sassoon Trophy Winners

WINNERS of the Sassoon Trophy, awarded annually in a photographic reconnaissance competition for PR units in 2nd ATAF, were 17 Sqn, based at Bruggen and equipped with Canberras, who carried off the trophy by the narrow margin of 45 points. Competing squadrons had to bring back visual reports and photographs from 500ft of three selected targets.

Splendid Ambassadors

ATTENDING his first university air squadron dinner since becoming AOC-in-C Flying Training Command, Air Marshal G. A. ("Gus") Walker spoke at RAF Newton last week of the "imponderable" benefits of the university squadrons. But he warned his hearers—members of Nottingham UAS and their guests—that the Treasury did not put these imponderables into the balance when they weighed up the country's finances; they looked to see what contribution was made to the nation.

Air Marshal Walker, who was proposing the toast of "The Squadron," congratulated Nottingham UAS on maintaining a splendid record; and in a comment on his new post said: "I do not think any man could be offered a more challenging task." He added that the Command was now expanding its training machinery to support the RAF's front line; and on the need for men of high calibre in both the GD and technical fields he told his university audience: "you can be such splendid ambassadors for our cause."

These remarks followed an enthusiastic tribute by the Vice-Chancellor, Mr B. L. Hallward, to the RAF as he had seen it in Cyprus during a recent visit—describing its life there as "vigorous, healthy and responsible"; and the question which he said the Prime Minister and Cabinet had raised, as to whether the university squadrons were "too expensive to the nation." Mr Hallward also commented that we were to become "part of Europe," and suggested to his audience that they should learn to become "proper Europeans." In welcoming his guests, Sqn Ldr H. S. Horth, the CO, reported a successful year. The flying target had been reached; and though they were not quite up to establishment in the technical flight, there was a waiting list for flying membership.

Tiger Balm

WHAT is described as "the largest airlift ever undertaken by the RNZAF" has been carried out recently by 40 and 41 Sqns. In an operation to take out to Malaya men and families of the 1st Battalion, New Zealand Regiment, and to bring back the 2nd Battalion, DC-6s of 40 Sqn have been flying between New Zealand and Singapore and Bristol Freighters of 41 Sqn between Singapore and Malacca and Ipoh. The operation—"Tiger Balm"—was commanded by Gp Capt A. P. Gainsford.

A Grumman Hellcat 2, KE209, at RNAS Lossiemouth. Transferred there from Stretton in June 1946, it was until recently used for flying practice and also as a communications aircraft, its last "owner" being Capt (now Rear Admiral) P. D. Gick. The aircraft was built in May 1945 and the original engine, a Pratt & Whitney Double Wasp R-2800-10W (24388), is still fitted

Amphibious Adventures

ONE of the most exciting wartime incidents in the career of Air Cdr S. W. R. Hughes, CBE, AFC, whose new appointment as AOC 19 Group (with the acting rank of air vice-marshal) was announced last week, occurred when a Sunderland he captained was "jumped" by two Messerschmitt 110s. This was when he was a flight lieutenant in 230 Sqn and they were flying from Egypt to Malta with two crews —19 men—aboard. One of the 110s was shot down and the other beaten off, but the Sunderland had to be ditched with two of its engines and an aileron shot away. It was successfully "sailed" 20 miles to land, hitting a reef off a cape near Benghazi, and the men managed to get ashore. There, however, new troubles met them.

They hailed some troops, thinking they were British, only to discover they were Italians retreating from Derna. These Italians took them prisoner and tried to force-march them along the coast. The RAF men delayed this as much as possible and eventually achieved a compromise: in return for a document saying they had been well treated, the Italians allowed them to escape. The Sunderland crews next encountered an even larger body of Italians, also in rout, who proved friendly; and they pressed on, taking Italian prisoners (to a total of about 150) and persuading desert Arabs to carry messages for them to the 8th Army, eventually making contact with the 4th Indian Division.

Air Cdre Hughes, a New Zealander, is at present Air Member of the Defence Research Policy Staff at Air Ministry. In his new post he succeeds AVM L. W. C. Bower, who is going to CENTO (this page, last week).

IN BRIEF

RAF Hawkinge, Kent, is closing down on December 8. It has until recently housed a WRAF officer cadet training unit which is moving to Jurby, IoM. No 1 RAF Gliding Centre is moving to Swanton Morley, Norfolk. Hawkinge was originally an RFC aircraft acceptance park.

During the first nine months of 1961, the RAF Benevolent Fund made 8,385 awards, amounting to £408,256, throughout Britain and overseas.

Sqn Ldr John Price, who until recently commanded 103 Sqn in Cyprus, has invented a floating stretcher for use in helicopter rescues. Three basic ideas are incorporated: flotation packs at the head of the stretcher to keep the patient's head clear of the water; a high rail to protect him against knocks from rocks or trees; and special strapping enabling him to be secured to the stretcher in 11 different ways. Sqn Ldr Price, whose invention is to be examined at Air Ministry, goes to the Staff College at Bracknell next year.

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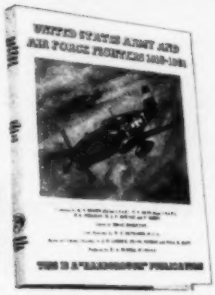

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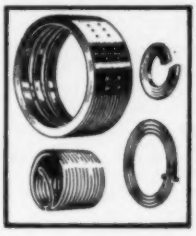

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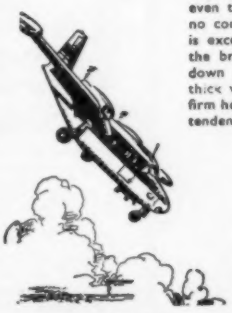

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Hugh Scanlan
Shell Aviation News
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INDEX TO ADVERTISERS

	Page
Airwork Ltd.	14, 16, 18
Benson (A.I.F.) Ltd., J. J.	15
Boulton Paul Aircraft Ltd.	Cover iii
Box 7681	16
British Aircraft Corporation	7, 9
British Airline Pilots Association	15
British Aviation Services	16
Burnley Aircraft Products Ltd.	Cover ii
B.T.R. Industries Ltd.	17
Commonwealth of Australia	17
Cross Manufacturing Co. (1938) Ltd.	13
Cunard Eagle Airways Ltd.	16
Derby Aviation	16
"Dictionary of Photography"	18
Elliott Brothers (London) Ltd.	2, 3
Harleyford Publications Ltd.	13
Hatfield College of Technology	17
Hawker Siddeley Aviation	4, 5, 12
Hunting Aircraft Ltd.	18
Iliffe Books Ltd.	15
Keegan Aviation Ltd.	14
Marconi's Wireless Telegraph Co. Ltd.	10
Marshall Flying Services	15, 16, 17
Martin Baker Aircraft Co. Ltd.	6
McDonnell Aircraft Co.	Cover iv
Miller Aviation	16
Ministry of Aviation	15
Piaggio	13
Plessey Co. Ltd.	Cover i
Rollason Aircraft & Engines Ltd.	15
Sperry Gyroscope Co. Ltd.	11
United Aircraft International Inc.	1
Westland Aircraft Ltd.	8
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"Yachting World" Annual	13

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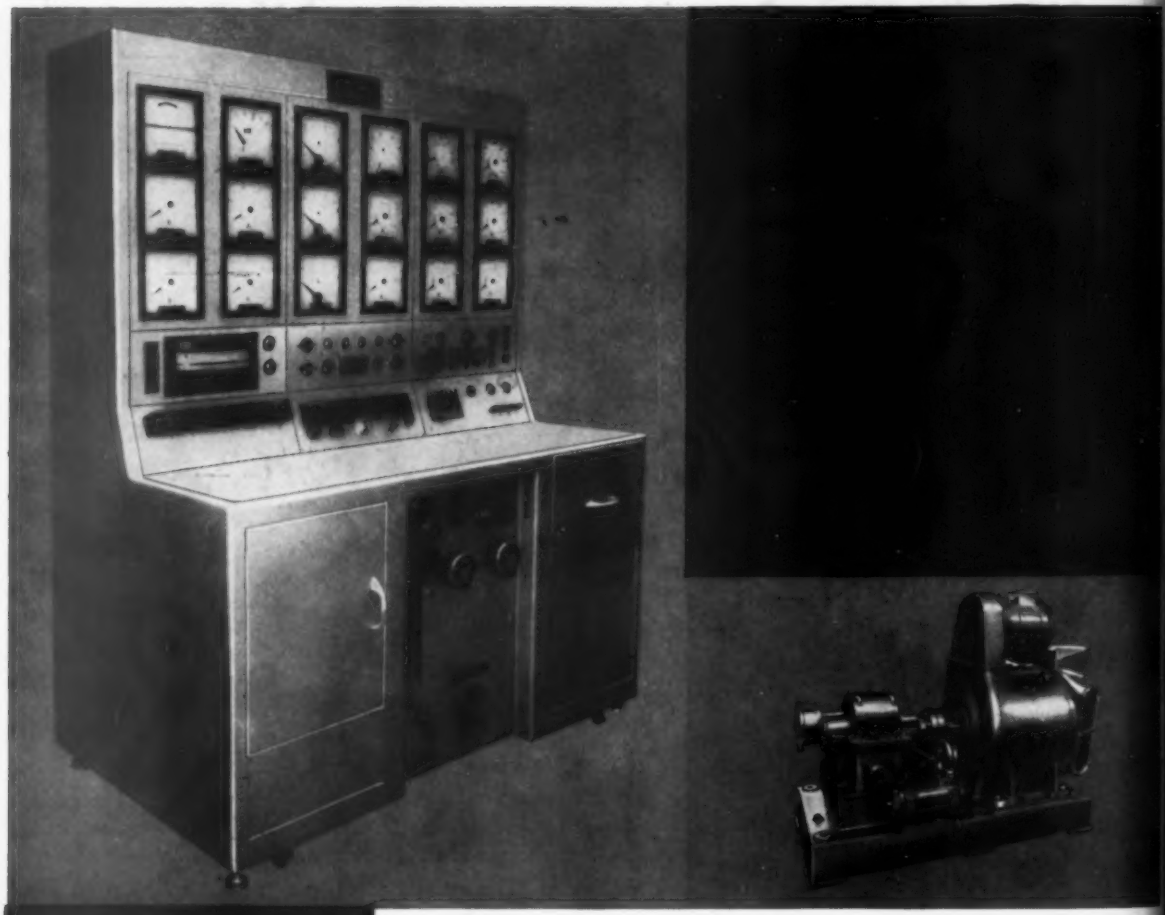

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